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BUILDERS' TRIAL OF THE BATTLESHIP MAINE.

Philadelphia, Pa., July 23.—The new battleship Maine is the fastest ship of her class ever built. This craft, Uncle Sam's latest fighting machine, launched from the yards of the Cramp company, was given her builders' trial on Wednesday night and Thursday morning last. At one time she developed a speed, by the logs, of 19.95 knots. Over the measured course from Overfalls light to the lightship on Five-Fathom bank and return she made 18.29 and these are the figures given out by the builders as the official result of the trial. The Maine left her dock Wednesday afternoon. Capt. Bucknam and Pilot Gus Clampitt were in charge, although the entire trial was under the personal supervision of Edwin S. Cramp. A distinguished party of guests were on board, among them two representatives of the Turkish government who are here superintending the construction of a warship for their government by the Cramps. The Maine's compasses and steering gear were adjusted as soon as the Delaware breakwater was reached. Night was falling when her prow was finally turned seaward, but a full moon and a light breeze made the conditions for a night trial ideal. At 7 o'clock she began to show her heels. At 7:20 the logs were heaved overboard. At 8 o'clock 11 miles had been recorded, the speed 17.36. The next observation at 8:30 showed a speed for the half hour of 19.5. Then all fans were turned on and under forced draft she made for the half hour ending at 9 o'clock the magnificent speed of 19.95, only a fraction under cruiser speed. All this time the Maine had been running straight out to sea, and at 9:45 when the engines were stopped she was on the edge of the Gulf stream. She drifted all night and at daybreak was 22 miles off Five-Fathom lightship. From there a course was laid for Overfalls light and within two hours the lightship was brought dead under the big ship's nose. This alone was considered remarkable, as with only temporary adjustment of compasses and steering gear the Maine did not steer off even half a point. Then over the measured course between Overfalls and Five-Fathom the Maine was again put through her paces and under natural draft made the round trip of 22½ knots at a speed of 18.29, which figures were painted on her stacks on the trip up the river as the official result of the trial. During the run over the measured course the logs as well showed a speed of 18.29, thus proving that they were correct during the night test.

During the entire trip the big battleship answered every call of her helm and for speed as has no other vessel that has ever gone out of the Delaware. Even at her fastest there was so little vibration that it could be noticed nowhere save far aft. She also ran with a dry deck fore. Even though not tuned up the engines ran throughout without a hitch and under forced draft sent the screws through the water at a rate of 125 revolutions the minute. When over the measured course under natural draft they turned at a rate of 122 revolutions a minute. On turning tests the Maine moving at an 18 knot speed turned in twice her own length and still maintained a good gun deck.

On her official trial the Maine is expected to show even greater bursts of speed if called upon, for the builders' trial was run with her bottom fouled by long standing in the Delaware, and beside ordinary bituminous coal was used, Pocahontas coal being very scarce. No battleship ever started on her builders' trial in so far advanced a stage of completion as the Maine, her main battery of four 12-in. guns being already mounted in the fore and aft turrets.

The Maine, namesake of the ill-fated Maine, is 393 ft. long, 72 ft. wide and draws 23 ft. of water when loaded, coaled and armed for service. Her engines are of 16,000 H.P., and all of this was developed during her trial. The Maine's displacement is 13,500 tons. Her sides are protected by 12-in. Krupp armor and her armament consists of four 12-in. and fourteen 6-in. guns in the main battery and twenty rapid-fire machine guns in the secondary battery. The price to be paid for her, exclusive of armor and armament, is $2,885,000, of which $2,000,000 has been paid. The balance is due when she has been in commission for six months.

A PROSPEROUS SHIP BUILDING ORGANIZATION.

When the American Ship Building Co. (consolidated lake ship yards) was organized in the spring of 1899 the Marine Review said it was capitalized on a very conservative basis and would undoubtedly prove one of the best of the numerous industrial organizations then being formed throughout the country. This opinion was evidently based upon the right kind of information. Although little more than three years has passed since the organization of this company, the directors are now up to the question of what to do with surplus earnings. This is a strange condition to find among the industrial consolidations, as it was the general opinion that they were all over-capitalized.

After paying 7 per cent. annually for the three years on its preferred capital of $7,900,000 the lake ship building combination has an estimated surplus of at least $3,250,000 to $3,500,000, with orders for new ships for next year of an aggregate value of about $7,250,000. In the list of orders for 1903 is included twenty-six freighters and two large side-wheel passenger steamers, to be built at Detroit for the Detroit & Cleveland Navigation Co., but no account is taken of seven or eight large vessels now approaching completion in the different lake yards, and which are to go into commission before the close of the present season of navigation. Profit on these will also be included in future earnings of the company.

In view of the surplus above noted and the prospects of another year's business equal to any one of the past three years, the stock of the company has attracted considerable attention during the past three or four weeks on the exchanges in Chicago and Cleveland. As it was not a large organization compared with the general run of industrials, the stock was not listed in New York and the company was rather looked upon as a close corporation—not one for general investment. But the local interest is sharp now that a neat surplus has shown up, and there is assurance of a large business for some time to come. Owners of the common stock feel, of course, that they are entitled to the surplus, or a very large part of it, as they have had no dividends, and for the additional reason that $20 a share was paid for the common in the beginning, to give the company a working capital. The issue of common stock amounts to $7,600,000 of $100 par value per share.

The present market price of this stock is $44 to $45 a share, but within the past few days there has been very little of it on the market around these figures, on account of rumors regarding different plans for reorganization which officials of the company have been considering—plans to retire the common stock entirely and thus secure the advantage of a reduced capital, rather than begin the payment of dividends on the common stock. It was at first reported that the scheme was to give a share of the preferred stock, now selling at par, for two shares of common, but such a proposition would very probably be rejected by the common stockholders. Another plan reported from Chicago within the past few days is an issue of bonds to retire the common stock. A Chicago stock brokerage house, writing a Cleveland client regarding the bond rumor, says:

"If the common stockholders would trade two shares of stock for a $100 5 per cent. bond, the company could retire all the common stock with an issue of only $3,800,000 of bonds, and still keep its entire surplus as at present. The bond would certainly go above par at the outset, as it would be a first mortgage on a company having a very prosperous business, with no indebtedness, and a large surplus back of a very low capital. The bond issue would be a small item, even in the present condition of the company. The surplus is now sufficient to take care of interest on the bonds for twenty years."

Officials of the company are giving out no information whatever as to plans regarding its finances. The company's statement regarding business for the fiscal year ended on the 30th of last month is thus far withheld, so that it is not possible to verify the reports as to surplus above referred to, although it is more than probable that they are correct, in view of the earnings of previous years. Action regarding the surplus is not expected until October, when the annual meeting will occur.

By crediting the common stock with the entire surplus of the company it would be given a book value of full $60 a share.

ANOTHER RECORD YEAR IN LAKE SHIP BUILDING.

Ships already ordered from the American Ship Building Co. for 1903 delivery will cost in round numbers $7,250,000. The number of orders will undoubtedly be increased, as negotiations are still under way with several owners. Contracts will very probably be placed within the next few days for vessels that will not come out until late next season. All berths that are capable of turning out new ships for the opening of navigation next spring are already engaged. The coming year is sure to surpass all previous years in the building line. Officials of the American company have closed orders within the past week for six large freighters. The 1903 list now includes one car ferry, two side-wheel passenger steamers, one freight and passenger steamer and twenty-four large steamers for the bulk freight trade—ore, coal and grain. All are steamers. There is not a single consort in the list of twenty-eight ships. The orders are: A car ferry for the Manistique, Marquette & Northern Ry; ten steamers of Canadian canal dimensions for Capt. A. B. Wolvin's St. Lawrence river-Quebec service; two steamers for Provident Steamship Co., of which Capt. A. B. Wolvin is general manager; six steamers for a syndicate headed by Capt. W. W. Brown of Cleveland; two steamers for G. A. Tomlinson of Duluth; two side-wheel passenger steamers for Detroit & Cleveland Navigation Co.; a freight and passenger steamer for Lake Superior service of the Anchor line, Buffalo; package freight steamer for Lake Michigan service of the Anchor line, and one steamer each for the Mack estate of Cleveland, for H. A. Hawgood of Cleveland and for C. W. Elphicke of Chicago.

"One woe doth tread upon another's heels, so fast they follow," murmured the dying tragedian as the second physician entered his room. This, indeed might be paraphrased about the contracts which the American Ship Building Co. is receiving, though they are undoubtedly not regarded as woes. They are certainly following fast enough. In the last issue of the Review it was stated that the ship building company had twenty-three new contracts on hand, not counting those for 1902 delivery chronicled earlier in the year. The twenty-third steamer was the one for Mr. C. W. Elphicke of Chicago. Since then five additional orders have been received, bringing the total up to twenty-eight vessels. Mr. G. A. Tomlinson of Duluth has given two contracts—one for a steamer for the Duluth Steamship Co. and one for a steamer for the Superior Steamship Co. These vessels are to be 436 ft. over all, 416 ft. keel, 50 ft. beam and 28 ft. deep. They will have twenty-four hatches. The estate of William S. Mack also gave an order for a vessel of the following dimensions: Length, 374 ft. over all; 364 ft. keel, 48 ft. beam, and 28 ft. deep. She will have triple-expansion engines and two Scotch boilers. Capt. A. B. Wolvin gave orders for two steamers for the Provident Steamship Co. of the following dimensions: Length, 400 ft. over all; 380 ft. keel; 50 ft. beam; 28 ft. deep. Each of these steamers will have twenty-one hatches. The steamer Hoyt, recently launched at West Superior, is the first boat of the Provident fleet.

The question of rank between Admirals Taylor and Bradford has been decided in favor of Taylor. The ruling is that Taylor is a rear admiral in fact while Bradford is a rear admiral by virtue of his appointment as chief of the bureau of equipment. Taylor was recently made a rear admiral while Bradford has held the rank for a number of years.

The Norfolk navy yard will be extended by the addition of a tract of land embracing 270 acres adjoining.

BENEFITS OF WATERWAYS.

Buffalo, July 22.—A perusal of the article by Mr. S. A. Thompson on the benefits of waterways, showing their great value still and their increase in Europe, spite of the multiplicity of railways, prompted me to make a direct application of the principles laid down and possibly to add something to the showing in a general way also. It will, of course, be hard to show that the canal or even the natural water course is ever going to be indispensable again for the mere local commerce, though it appears that even this loss of value has passed its lowest point and has made a distinct gain in late years. Our merchants have found that they must order freight from Cleveland by boat if they expect prompt delivery and flour comes through from the west in much shorter time by lake than by rail.

But this is partly on account of the extra flexibility of the waterway and partly because the roads are undertaking more than they can do. They can carry about so much freight in a given time and the competition among them has become so great of late that they must come fairly up to capacity all the time or they cannot make much profit. So it often happens that there is a considerable excess of business offering. It will never pay the roads to provide regularly for this excess. Their only profitable course is to equip themselves for the average amount of business, yet how far this method is away from the requirements of the carrying trade need not be said. All that need be done is to point to the rapid increase of this fluctuation in the demand for transportation. Every year this demand is farther and farther from being met.

There are, of course, only the waterways to meet this condition. The freight train makes a quicker trip from Chicago to Buffalo now than ever before and it carries a heavier load, but the average time of a consignment of freight in transit by rail between the two cities is growing longer and the water route is much the shorter and surer one, in spite of the fact that the water route is longer than the rail route by 350 miles. This difference will widen for a long time yet, from the fact that the increase, and particularly the fluctuation in amount of business is more marked than the increase of rail facilities. Besides it will never be a more profitable business for the roads to carry promptly all the freight that offers than it is now. Rather the opposite.

So we must stand up for the water route and the roads should do the same, for the relief afforded them by the taking care of the excess of commerce, always something that they do not want and are bound to handle at a loss and therefore to do badly. The all-rail time for flour from the other side of Lake Michigan to Buffalo is no longer known. It may be days—it may be so many weeks. It has been known to be six months. The water time can be told within a few hours usually.

An eastern agricultural paper last week boasted that it had no opinion on the subject of the enlargement of the Erie canal outside of the known opposition to it by the New York state farmer, who would never exchange one cent of taxation for $100 of benefit, especially if it appeared that any one else were likely to share with him largely in the benefit. Now this is the attitude to be expected of the farmer, whose surroundings always incline him to special and not general reasoning. It is strange that any portion of the press should further this method of thought, merely to enable it to stand in with its readers.

The point brings us to the second reason for canal advocacy, the building up of the country. It may possibly be argued that water, and especially canal, prominence in this direction is over, but when are the railroads going to begin? It is fully fifty years since their ascendancy began and if they have increased the city population it has always been at the expense of the country, a very doubtful proceeding. We look now for the waterways, and especially the Erie canal, to multiply manufactories and through them to increase the population again indirectly much faster and more to the general welfare than before railroad days, and we look for the two to work together, each in its well-defined province, to the same end—the making of human effort and human labor more effective.

There is no movement so calculated to accomplish this as the effort to modernize our canal systems, especially where they are in position to carry on a large through traffic. It is not believed that the people at large will be turned from the accomplishment of this end by the efforts of any interest that is willing to injure itself in order to injure another interest more.

JOHN CHAMBERLIN.

SUMMER MANEUVERS OF NORTH ATLANTIC SQUADRON.

Summer maneuvers of the North Atlantic squadron off the New England and middle Atlantic coasts have begun. From now until the end of the first week in September the squadron will work out problems prepared by the general board and busy itself with drills and evolutions with short interruptions for coaling and taking on supplies. The picturesque feature of the summer's work, and the one which is exciting the most interest, will be the attempt of several war vessels, representing an enemy, to gain the coast through a vigilant defending squadron. The latter will send out scouts and use its utmost endeavor to locate the invaders before any of them slip through the lines and put the guardians of the nation's safety to shame. The navy department now announces that this feature of the maneuvers will take place from Aug. 20 to 25, inclusive. The movements involved in this problem game, it is announced, will not extend below Cape Hatteras to the south or beyond Eastport, Me., to the north, but the specific limits within which the enemy's ships will be defied to reach the coast will not be made public. Only the officers in command of the ships engaged will possess that information. It is understood that the attacking forces will have certain specified limits within which to strike, and the defenders naturally will be made aware of these limits. It is not desired to make the information public property, for fear that following the movements so closely may result in information as to the vessel's whereabouts at the critical time finding its way to the opposite side, thus, destroying the value of the game and depriving it of its zest.

This "war game" will cover an area of water 800 miles down the coast and perhaps 500 or more out in the Atlantic. The division of the North Atlantic squadron into an attacking and a defensive force has been placed entirely in the hands of Rear Admiral Higginson, the commander in chief of the station. The "enemy's" ships will be the fleetest which can be conveniently assigned to that duty, for a slow moving craft would furnish too easy prey for the defending ships and scouts. Gen. MacArthur's temporary assignment to the command of the department of the east will cover the period to be consumed in the maneuvers. Gen. MacArthur and Rear Admiral Higginson have received the libretto of the war drama that is to be played, and the assignment of characters and the rehearsal of parts will be their own work. The joint maneuvers, according to the present plan, will begin the second week in September.

ADDRESS BY MR. JAMES GAYLEY AT DULUTH.

The launching of the new steel steamer James H. Hoyt at the American Ship Building Co.'s West Superior (Wis.) yard last Saturday was attended by a number of the officials of the Steel Corporation. After the launch a dinner was given to the guests by Capt. and Mrs. A. B. Wolvin. Among those who were present were Mr. James Gayley, first vice-president of the Steel Corporation; Mr. W. R. Walker, New York, assistant to President Charles M. Schwab; Mr. W. E. Corey, Pittsburgh, president of the Carnegie Steel Co.; Mr. D. M. Clemenson, president of the Pittsburgh Steamship Co.; F. Morrison, Pittsburgh, managing director of the Carnegie Steel Co.; D. G. Kerr, Pittsburgh, ore agent of the Steel Corporation; W. H. Johnson, Ishpeming, Mich., agent for the Oliver Iron Mining Co.

Mr. Gayley made a speech of great significance. He spoke of the beneficial effects of the organization of the Steel Corporation. The first among these he placed the stability which it has given to the iron and steel market. Buyers of iron and steel products are assured that prices will be stable, and therefore are not forced to buy simply from hand to mouth in the fear of an uncertain market. The purpose of the corporation is to maintain this stability of price. Another direction in which the organization has worked beneficially is in the foreign field. For the surplus product of the manufactories a market is found in foreign countries and the corporation caters to this trade by learning its needs and requirements and modeling its output to suit them. Formerly the different manufactories did business with foreign countries in rather a desultory way, selling their surplus here and there as best they could. Now the foreign market is closely studied and gets what it wants and not what it will not take.

Mr. J. L. Washburn made a brief speech, in the course of which he hoped that the offices of the corporation, now located at Duluth, would not be moved elsewhere. This remark brought Mr. Gayley to his feet to say that mining and transportation offices of the corporation had been located at Duluth after deliberation and were there to stay. It is generally agreed that the mining offices are properly located, but the establishment of the transportation offices of the company at Duluth, especially in view of their separation from the ore railways of the Steel Corporation, has been from the beginning a matter of surprise to everybody connected with lake shipping.

NOVA SCOTIA STEEL & COAL CO.

At a full meeting of the directors of the Nova Scotia Steel & Coal Co., held in Montreal last week, Mr. Graham Fraser, the managing director, submitted to the board a most gratifying report of the business of the company for the first six months of the present year, showing that the various departments were being fully operated with very satisfactory results. He reported the completion of a modern and fully up-to-date coal shipping pier at North Sydney, having a storage capacity of 5,000 tons, the loading facilities being exceptionally good, there being a depth of water of 30 ft. at low tide along its shipping side, the height being 66 ft., thus enabling the largest steamers afloat to be bunkered promptly. What may be considered a record was made at this pier recently, when with seven chutes aboard, coal was loaded at the rate of 100 tons per minute, the breakage reduced to a minimum, and being much less than by any other system at present in use. Ample provision has also been made for the loading of sailing craft from chutes, when there is not sufficient depth of water for steamers to load.

The coke ovens at Sydney mines and Ferrona, with their auxiliary washing plants, are in operation, making a very superior quality of coke, and fully supplying the present requirements of the company. The steel plant at Trenton was reported crowded with orders, and every department working full time. The company's fleet of ten large time-charter freight steamers, aggregating over 53,000 tons total dead weight, are doing exceptionally good work this season.

The company was very fortunate in securing, with the purchase of the old Sydney mines coal property, a large tract of land at Sydney mines. On account of the location of the blast furnaces and the extension of the company's coal operations, this land has become very valuable, and is being rapidly disposed of at good prices, the anticipation of a town of 15,000 or 20,000 people growing up, leading to rapid and permanent building operations. The purchase of two freight steamers in Scotland was also reported. These boats are to be used in the transport of coal from Sydney mines to the St. Lawrence and lower province ports. They are of the most modern type, being admirably adapted for the coal business—self-trimmers, light draught, and with every appliance for rapid discharge.

DOUBLE-HULLED STEAMSHIPS.

The St. Louis & Beaumont Transportation Co. has been formed to construct a combination gulf and river steamboat under the patents of Capt. George O. Rogers. The idea is to construct a steamer that can navigate the rivers with ease and the gulf with safety. The usual light draught of a river boat makes the navigation of the vessel in the heavy seas a dangerous one. The Rogers vessels are what may be called double-hull. The inner hull is a complete steamer in itself, subdivided by bulkheads into compartments containing the engines, boilers, quarters for the crew and cargo. This inner hull is susceptible of being moved up or down while the outer one remains practically stationary. This movement is controlled by a series of hydraulic cylinders secured to the outer hull with rams attached to the inner one. When the inner hull is raised to its highest point it projects from 6 to 8 ft. above the outer one, and the bottoms of the two hulls are then in the same horizontal plane and the excess of weight on the inner hull over its displacement is taken by the outer. In this position the vessel will be capable of running in rivers and shoal harbors. When the inner hull is lowered to its lowest point its keel or bottom is about 6 ft. below the bottom of the outer hull. In this position great stability and steadiness is attained.

THE CAREER OF JOHN W. GATES.

In a five-column interview, published in the New York Commercial-Advertiser, Mr. John W. Gates makes the claim that he is the real organizer of the United States Steel Corporation. The touch of verisimilitude in the revelation is sufficient not alone to give plausibility but probability to the story. This is his account of how the great steel trust originated:

"In talking with James J. Hill one evening in January of 1901 he informed me that J. P. Morgan was very much disturbed over the iron and steel situation. The Carnegie Steel Co. was threatening to build a large steel tube plant and become a competitor of the National Tube Co., in which Mr. Morgan was largely interested and instrumental as a banker in bringing out. After several hours' talk with Mr. Hill I told him that, in my opinion, there was but one way to manage the iron and steel business of the United States, and that was by an actual consolidation, and that if Mr. Morgan would go to work at it right all the iron and steel companies of the United States could be brought into one company. Next day Mr. Morgan telephoned me, and asked me to come down to the bank and explain what I had said to Mr. Hill. I did so, and outlined to Mr. Morgan a plan for the formation of what was afterward named the United States Steel Corporation.

"I told him about the lines and general terms I thought would have to be adopted to obtain the Carnegie Steel Co., which, being the largest and most aggressive steel works in the world, was the bone of contention among all the iron and steel manufacturers. I assured him that there was but one way to accomplish the consolidation, and that was by getting Mr. Schwab, with whom I was very well acquainted, and with whom I had talked about the matter many times, to agree to a plan in advance and submit that plan to Mr. Carnegie and get his approval, and then go ahead and consummate the consolidation.

"Mr. Morgan requested me to see Mr. Schwab and arrange a meeting at his residence. This I did, having first posted Mr. Schwab regarding my former talk with Mr. Morgan on the subject. We finally mapped out a plan after several hours' talk that Mr. Schwab through Mr. Carnegie would agree to, and that I strongly recommended. After many conferences with the various concerns that now form the United States Steel Corporation—namely, the National Steel Co., the American Steel Hoop Co., the American Steel & Wire Co., the Federal Steel Co., the Carnegie Steel Co., the American Tin Plate Co., the American Sheet Steel Co. and the American Bridge Co., together with the H. C. Frick Coke Co., which, in reality, was a Carnegie concern—the basis was made and all these properties put together.

"I am familiar with all the plants of the United States Steel Corporation, with all their ore properties, blast furnaces, steel works, transportation lines, both railroad and lake steamship, and the value of each, and I have never sold a share of my United States Steel stocks. I believe they are the cheapest stocks listed on the New York Stock Exchange today. The business of the United States Steel Corporation is world wide. I regard the formation of the United States Steel Corporation as the greatest factor for the laboring man that has ever been brought about in America, as they employ practically two hundred thousand men, who are paid at least from 40 to 75 per cent. higher wages than foreign competitors pay for the same class of work. It insures the manufacture of a first-class quality of steel at a reasonable price, the price of steel rails today being only $28 a ton, as compared with the foreign price of fifteen or twenty years ago, before rails were made in the United States, of from $75 to $125 a ton delivered. Just think of it—rails at $28 a ton today, as against $125 less than a score of years ago!"

Mr. Gates' autobiography, published in the same issue, is intensely interesting. He tells how he rose from a traveling salesman to be a millionaire and one of the financial powers of the country. He says:

"First I started traveling for Isaac L. Elwood. I erected the first corral in the state of Texas, hiring men to help me put it up to show the rangers what use could be made of barbed wire. I had not traveled very long when I came to the conclusion that there was more money in the manufacture of barbed wire than there was in selling it at a salary of $100 per month. I had a friend in St. Louis—I was living in Chicago at the time—by the name of Alfred Clifford. Mr. Clifford and I started in to manufacture barbed wire in a very small way. I think we had three barbed wire machines. Our total investment was less than $8,000 to start with. The business proved very profitable, and we shortly increased it, not in the same factory, but in an independent factory. We started an unincorporated concern under the name of J. W. Gates & Co., into which eight of us put each $2,500, making a total of $20,000. All of these gentlemen are still alive. We declared dividends of about 50 per cent. per week. I would travel and sell the wire, come back, invoice it, bill it, paint it, market it and collect the money. I traveled for about two years. Our profits for the first year were $150,000. As I was doing most of the work I suggested to six of my partners that they make a give or take offer. They refused, but asked me to make the offer. They accepted my offer, and sold, leaving no one with me but Clifford. Then, in 1880, we incorporated the Southern Wire Co., with a capital stock of $50,000, of which I was the owner of 48 per cent., Mr. Clifford 48 per cent. and a Mr. Rowe 4 per cent. Profits for the next year were $188,000. One of the parties of the Big Eight, Mr. Edenborn, went into opposition to us. At the end of three years our plant was destroyed by fire. The morning after the loss I called up Mr. Edenborn and suggested that he meet me and Mr. Clifford and see if we could not agree upon a consolidation. Within fifteen minutes we had reached an agreement, so that we erected the new works out where the Edenborn plant was located. Then we concluded to build a mill near Pittsburgh, and selected Rankin as a site. In 1884 we began the erection of what is now known as the Braddock mill. We started in to build a mill that would cost us $110,000. We concluded that we would incorporate for $100,000 and borrow the $10,000. Before we had completed the mill $250,000 had been expended, and we were obliged to borrow $150,000. Mr. Clifford, Mr. Edenborn and myself always went on the notes of the company jointly to make them good. We began operations in the mill early in 1886, and I went abroad for the purpose of buying steel, it being unobtainable in the United States—I mean steel billets. I purchased about 50,000 tons of steel in Great Britain for shipment via Baltimore to the Rankin mill. I had great difficulty in obtaining a bankers' credit to satisfy the European makers. Finally I called upon Mr. Morgan, and he very cheerfully gave us credit for £60,000 sterling, which was more money than we were worth. Owing to our exceedingly large purchase in Europe the price of steel advanced $5 to $10 a ton, which meant a profit to us of from $250,000 to $500,000. I sold 10,000 tons of the steel to the Carnegie company without touching it, simply delivering the shipping documents to them, and thereby made $100,000 net profit. The balance of the steel we worked up into rods and wire.

"Our profits in the manufacture of wire in 1885 were very small, caused largely by the Grant-Ward panic. The year 1886 was fairly good. In 1887 we realized the profits of the steel purchased in Europe in 1886, together with the steel sold to the Carnegie-Phipps Co. We settled with them by taking their notes at four and six months. In 1887 we increased the capital stock of the Braddock Wire Co. from $100,000 to $500,000, we paid a cash dividend of $100,000—making a 500 per cent. dividend as the result of work during 1884, 1885, 1886 and 1887.

"During all these years we were in bitter litigation with the Washburn & Moen Mfg. Co. and I. L. Elwood on account of barbed wire patents. Our customers all over the United States and in foreign countries where we were trying to work up a trade were harassed to such an extent that between the years 1880 and 1890 we paid out on account of patent litigation more than $1,000,000. In 1890 I persuaded Mr. Elwood and the Washburn & Moen Co. that they had better sell their patents to a new company, which I would organize, that would own all the patents on barb wire and barb wire machinery. The patents all went into what was known as the Columbia Patent Co., of which I was president, and we had practically a monopoly of the wire fence business. This company operated until the expiration of the patents, and for many months paid dividends of 100 per cent. per month. Its capital was $100,000.

"In 1892 we took in the Lambert & Bishop Wire Fence Co. of Joliet, Ill., and we purchased the Baker Wire Co. of Lockport, Ill., giving our unsecured notes at one and two years. We paid off all of the notes within a year. In 1888 I bought control of the Iowa Barbed Wire Co. of Allentown, Pa. Its capital stock was $400,000 and the bonded debt $150,000. It had a floating indebtedness of $700,000, and was of course absolutely bankrupt. But we did not know it. I divided my interests with my partners, Mr. Clifford and Mr. Edenborn, giving them all they cared to take. Confronted with an enormous floating debt, we put it all into the shape of notes. In twelve months they were all paid off. In 1892 we consolidated the Iowa Barbed Wire Co. of Allentown, the Braddock Wire Co. of Pittsburgh, the Southern Wire Co. of St. Louis, the Baker Wire Co. of Lockport and the Lambert & Bishop Wire Co. of Joliet into the Consolidated Steel & Wire Co., with an actual paid in capital of $4,000,000. I managed that company's affairs from 1892 till some time in 1895, during which period the average net earnings were between 27 per cent. and 28 per cent., or about $1,100,000 per annum. In 1895 I was elected president of the Ilinois Steel Co. I had acquired an interest of about 27,000 shares, which I bought at around $30 per share."

At this point in his narration Mr. Gates ceased divulging his profits which are figured by the millions since 1898. He told briefly of the organization of the Federal Steel Co. in 1898 with a capital stock of $98,000,000 to take in several steel companies. He explained the consolidation of many wire companies into the American Steel & Wire Co. with a capitalization of $90,000,000. Then followed his account of the steel trust. Coming down to the recent Louisville & Nashville deal, Mr. Gates said:

"On Louisville & Nashville we had the opinions of the best experts and auditors in the country that it was worth more per share than Illinois Central before we started into it. We knew it had $25,000,000 of quick cash assets in its treasury. The public did not know that. When we started in to buy the stock, we started in knowing the actual intrinsic value of the company and its exact physical condition, and we had reports of auditors on its financial condition. When we obtained 306,000 shares of stock—the amount we started out to get—there was a short interest in the market of 150,000 shares. Of it 100,000 shares was foreign short interest; 50,000 was stock Mr. Belmont had sold under a resolution of the board authorizing its sale. These 50,000 shares were not good deliveries for thirty days, and if we had called the stock and insisted upon the specific performance of contracts, as we had every right to do, we could have caused a panic greater than the May 9 panic. The proposition was made to me by a thoroughly responsible man financially that if I would call and insist upon delivery of Louisville he would sell 500,000 shares of stock and give me half the profits for doing it. Mr. Morgan's people sent to my hotel and awakened me at 1.30 in the morning and stated that at a meeting of bankers it had been determined that we were owners of Louisville & Nashville, and they wanted to know what we proposed to do about it, stating that it meant a panic probably greater than the May 9 panic. I told them the proposition that had been made to me, but that under no circumstances would we insist upon specific performance of the deliveries of Louisville & Nashville stock, as we had no wish whatever to cause any panic or to make any one lose money in stocks they held. We loaned Mr. Belmont's people all the stock they wanted, without any premium charged.

"The people interested with me in the purchase of Louisville & Nashville were able to have paid for the stock they bought four times over in cash. The newspapers often allude to me as doing this and that, though I may not have more than a 1 or 2 per cent. interest. There are a lot of fellows who are always willing to go along with me, however, and take my judgment, believing that I will treat them fairly. Many men have been with me for ten or twenty years, and have always made money. I do not say that they have not made losses, but the net result has been that they have made millions of dollars. This is true of a great many men here in New York. If there was a loss I went to the end with them, and if there was a profit I went to the end."

What is stated to be the oldest ship in the world has recently been sold at Teneriffe to be broken up. This is the Italian ship Anita, registered at the port of Genoa. The Anita, which resembled Christopher Columbus' ship, the Santa Maria, was built in Genoa in 1548 and effected her last voyage at the end of March, 1902, from Naples to Teneriffe, six or seven weeks ago. The Anita was of tremendously stout build and had weathered countless storms and tornadoes in all parts of the world; but, says the Shipping World of London, it was also the slowest ship afloat, taking 205 days on one voyage from Baltimore to Rio de Janeiro.

IRON AND STEEL INDUSTRY OF CANADA.

Mr. George Johnson, dominion statistician, in the statistical year book of Canada for 1901, just out, gives some exceedingly interesting facts regarding the iron and steel industry in Canada. It is shown that the duty upon iron and steel manufactures from Great Britain is only two-thirds that imposed upon these products from the United States, yet the volume of trade in different forms of iron and steel, such as railway supplies, machinery, castings, hardware, etc., is almost entirely with the United States. The iron ores of the dominion have a wide range, both geographically and geologically. The annual consumption of iron and steel and their products in Canada is between 800,000 and 820,000 tons. The active works in Canada are: Nova Scotia Steel Co., blast furnace at Ferrona, N. S.; Hamilton Steel & Iron Co., Hamilton, Ont.; Canada Iron Furnace Co., Midland, Ont.; Dominion Iron & Steel Co., furnaces at Sydney, N. S.; Deseronto Iron Co., Deseronto, Ont.; Canada Iron Furnace Co., Radnor, Que.; Drummondville furnaces, Drummondville, Que. The last three are charcoal furnaces.

The annual aggregate capacity of all the completed and unfinished furnaces is nearly 1,100,000 gross tons. The Lake Superior Power Co. is building at Sault Ste. Marie, Ont., a very extensive plant for the manufacture of pig iron, steel and steel rails, the latter the first established in Canada. The united investment at Sydney, Hamilton, Deseronto, Midland, New Glasgow, Radnor, Drummondville and Ferrona amounts to $24,500,000, which will be increased to $35,000,000 by new plant now building. Within five or six years the total investment will aggregate, approximately, $50,000,000.

The production of pig iron in the dominion of Canada, as ascertained from the manufacturers by circular, amounted in the calendar year 1901 to 244,976 gross tons, as compared with 86,900 tons in 1900; 94,077 tons in 1899 and 68,755 tons in 1898; 53,796 tons in 1897; 60,030 tons in 1896; and 37,829 tons in 1895. Of the production last year 228,893 tons were made with coke, and 16,083 tons with charcoal. The production of Bessemer pig iron included above amounted to 29,577 tons. Neither spiegel nor ferro-manganese was made.

On Dec. 31, 1901, there were twelve completed furnaces in Canada and four furnaces were in course of construction. Of the completed furnaces, seven were in blast and five were idle on the date named. During 1901, four furnaces were erected by the Dominion Iron & Steel Co., at Sydney, Cape Breton, Nova Scotia, three of which were blown in in 1901. The fourth furnace was put in blast in January, 1902. Of the twelve completed furnaces, seven were equipped to use coke for fuel, three charcoal, and two charcoal and coke.

The following table gives first, the annual production of pig iron in Canada, ended with June 30, in the years indicated, showing that made from foreign ore and domestic ore respectively; second, the importation of pig, kentledge and cast scrap iron for home consumption, the three columns showing the total consumption; and third, the percentage of home manufactured pig to the total consumption:

Year.	Foreign ore, net tons.	Domestic ore, net tons.	Imports, net tons.	Total consumption, net tons.	Per Cent.
1898	53,463	19,576	40,995	114,035	63.1
1899	46,186	31,861	48,594	126,641	61.6
1900	62,221	34,618	65,330	167,169	60.9
1901	50,581	99,758	40,282	190,621	78.9

Previous to 1898 no foreign ore was used in the manufacture of pig iron in Canada. Following are the amounts of bounty which have been paid by the dominion government upon the production of pig iron in Canada:

Fiscal Year.	Amount.	Fiscal Year.	Amount.
1884	$44,090	1893	$93,896
1885	38,655	1894	125,044
1886	39,270	1895	63,384
1887	59,576	1896	104,105
1888	33,314	1897	66,509
1889	37,234	1898	165,654
1890	25,697	1899	187,954
1891	20,153	1900	238,296
1892	30,294	1901	351,259

From 1884 to 1889, both years included, the bounty paid was at the rate of $1.50 per net ton; from 1890 to 1892, at the rate of $1.00 per ton; from 1893 to 1897 at the rate of $2.00 per ton, and from 1898 to 1901 the rate paid has been $3.00 per ton on iron made from Canadian ore, and $2.00 per ton on iron made from foreign ore.

The following table shows the quantities and amount of bounties paid by the dominion government on steel ingots, steel billets and puddled bars in the years indicated:

Fiscal year.	Steel ingots. Net tons.	Steel ingots. Bounty.	Steel billets. Net tons.	Steel billets. Bounty.	Puddled bars. Net tons.	Puddled bars. Bounty.
1896	....	....	29,749	$59,498	2,806	$5,611
1897	....	....	8,683	17,366	1,509	3,019
1898	18,137	$54,412	*4,912	*13,042	2,615	7,706
1899	24,881	74,644	†	†	5,837	17,511
1900	21,453	64,360	†	†	3,374	10,121
1901	33,352	100,058	†	†	5,568	16,703

*Made in 1896-97 and bounty paid in 1897-98.

†No bounty paid on steel billets after June 30, 1897.

The following shows the value of the exports of iron and steel goods manufactured in Canada in the fiscal years named, which includes pig and scrap iron, stoves, castings, rolled iron and hardware, steel and manufactures of, sewing machines and machinery: 1898, $606,082; 1899, $706,411; 1900, $1,425,163; 1901, $1,432,961.

The value of the imports of iron and steel, and manufactures thereof, into Canada, dutiable and free, in the fiscal years named, was as follows:

	Dutiable.	Free.	Total.
1898	$12,691,772	$3,864,989	$16,556,761
1899	15,621,346	4,147,379	19,768,725
1900	22,169,913	7,130,160	29,300,073
1901	18,738,135	8,042,323	26,780,458

The above does not include the value of imports of ships' boilers, fish hooks, printing presses, surgical and dental instruments, and tin plates and sheets.

REAR ADMIRAL O'NEIL ON DUSSELDORF EXHIBITION.

The Review recently had occasion to drop a note to Rear Admiral Charles O'Neil, chief of the bureau of ordnance of the navy department, asking him whether the armament of the two new battleships and armored cruisers had, as yet, been decided upon, and what impressions he had brought away with him from Dusseldorf. His reply is much to the point. He writes:

"With reference to the batteries of the two battleships and two armored cruisers authorized by congress at its last session, I beg to inform you that this armament will be as follows:

"For the battleships—Four 12-in. guns of 45 calibers length; eight 8-in. guns of 45 calibers length; twelve 7-in. guns of 45 calibers length; twenty 3-in. guns of 50 calibers length; twelve 3-pounder guns; eight 1-pounder guns; two machine guns (small-arm caliber); six automatic guns (small-arm caliber); two 3-in. field guns.

"For the armored cruisers—Four 10-in. guns of 45 calibers in length; sixteen 6-in. guns of 50 calibers in length; twenty-two 3-in. guns of 50 calibers in length; twelve 3-pounder guns; four 1-pounder guns; two machine guns (small-arm caliber); six automatic guns (small-arm caliber); two 3-in. field guns.

"With regard to my visit to Dusseldorf, I was most favorably impressed with the development of the steel industry in that section of Germany, which consisted in the manufacture of machine tools, steel castings, forge and engine works, cranes and hoisting machinery, steel tubes, steel wire rope, seamless boilers, casks and drums, steam and gas engines, electric generators, cutlery, etc., to say nothing of the superb exhibition by Krupp's works of guns, mounts, turrets and armor plate.

"The exhibition at Dusseldorf was of a most interesting character, and included a fine display of the liberal and fine arts. The exhibition of field artillery, of weldless steel tubes and pressed steel by the Rheinische Metallwaren Co., was also very fine. The Congress of Naval Architects, which sat in the Tonhalle June 2 to 5, was very interesting and was attended by many distinguished persons from all over Europe. The principal papers were by Mr. Schrödter on 'Iron Industry and Ship Building in Germany;' Mr. Gotthard Sachsenberg on 'The Materials and Tools for Ship Building at the Dusseldorf Exhibition;' Baron von Rolf on 'The Development of the Navigation on the Rhine;' Mr. Schleifenbaum on 'The Use of Steel Wire Rope for Navigation.'

"I was invited by the directors of Herr Krupp's works to visit their establishments at Essen and Magdeburg, and was shown great courtesy at both places and given every opportunity to see such parts of their great establishments as I desired, and naturally designated the gun and armor factories, both of which are on an immense scale. The character of the work and method of performing it were excellent, and I was most favorably impressed with what I saw. It is quite evident that the aim of this establishment is to excel in the manufacture of its specialties. Throughout Germany I was struck with the thoroughness which prevailed at all the establishments I visited. My visit was interesting and instructive, but I have not time to go into particulars, as a good many things requiring my attention were left over until my return. I am sure, however, that it would be of great advantage to our government to have its officers occasionally see what other countries are doing in the same line, as there is always much to learn, and contact with the outer world is sure to broaden our views and help us to better understand our neighbors."

SHIP BUILDING NOTES FROM NEWPORT NEWS.

Newport News, Va., July 23.—The Newport News Ship Building & Dry Dock Co. has just taken an order for a repair job that will amount to something like $250,000. The steamer Sarah V. Luckenbach, one of the Luckenbach fleet, has arrived at the ship yard and the steamer Harry Luckenbach of the same fleet is expected to follow shortly. Both will be converted into oil tankers. The work will require some time, but it will be rushed as fast as possible.

It is reported here that another German warship will come to the ship yard for overhauling. The cruiser Vineta, flagship of the German South Atlantic squadron, is now at the ship yard being completely overhauled and it is probable that she will remain here for several weeks yet. It is now understood that the German cruiser Falk, also of the South Atlantic squadron, will come here for an overhauling as soon as the Vineta relieves her on the station. It was first reported that the Falk would be here this week, but the rumor was groundless.

The monitor Arkansas was given her builder's trial several days ago with the result that she easily made her contract speed, 11.5 knots, and in every way came up to the expectations of her builders. It was given out in Washington this week that the official trial of the Arkansas would take place Aug. 6, but at the ship yard the statement was made to your correspondent that the date had not been settled and that no notice had gone from the ship yard to the navy department. The Arkansas has made wonderful progress in the past few months. It was only a short time ago that there were two other monitors of the four building ahead of her, but the ship yard pushed the work and soon had its vessel at the head of the list. She is the first to be completed.

It is understood that the Old Dominion steamship Monroe, which will be a floating palace and will go in service between Virginia and New York, will be launched in the next ninety days. It is said that the Old Dominion line is in need of the ship and has requested that the work be pushed.

The Burt Manufacturing Co., Akron, O., has issued a little booklet devoted to its Cross oil filter. The purpose of the filter is the saving of waste oil. As the preface says, every user of lubricating oil appreciates the fact that the larger portion of all the oil he buys is not consumed by the machinery on which it is used, but passes through, and but for the fact that it becomes filled with dirt and grit could be used over and over again. The waste frequently amounts to from 50 to 75 per cent. of the oil used. With a Cross oil filter on hand oil may be used over and over again. So sure is the company that the filter can do its work that it will send it to anyone on thirty days' trial. If not satisfactory it may be returned at the company's expense. The booklet, describing the filter in every detail, may be had for the asking.

Mr. J. C. Gilchrist of Cleveland has purchased the steel steamer Vega from Drake & Maytham of Buffalo.

TWO VESSELS ON SAME TRIAL COURSE.

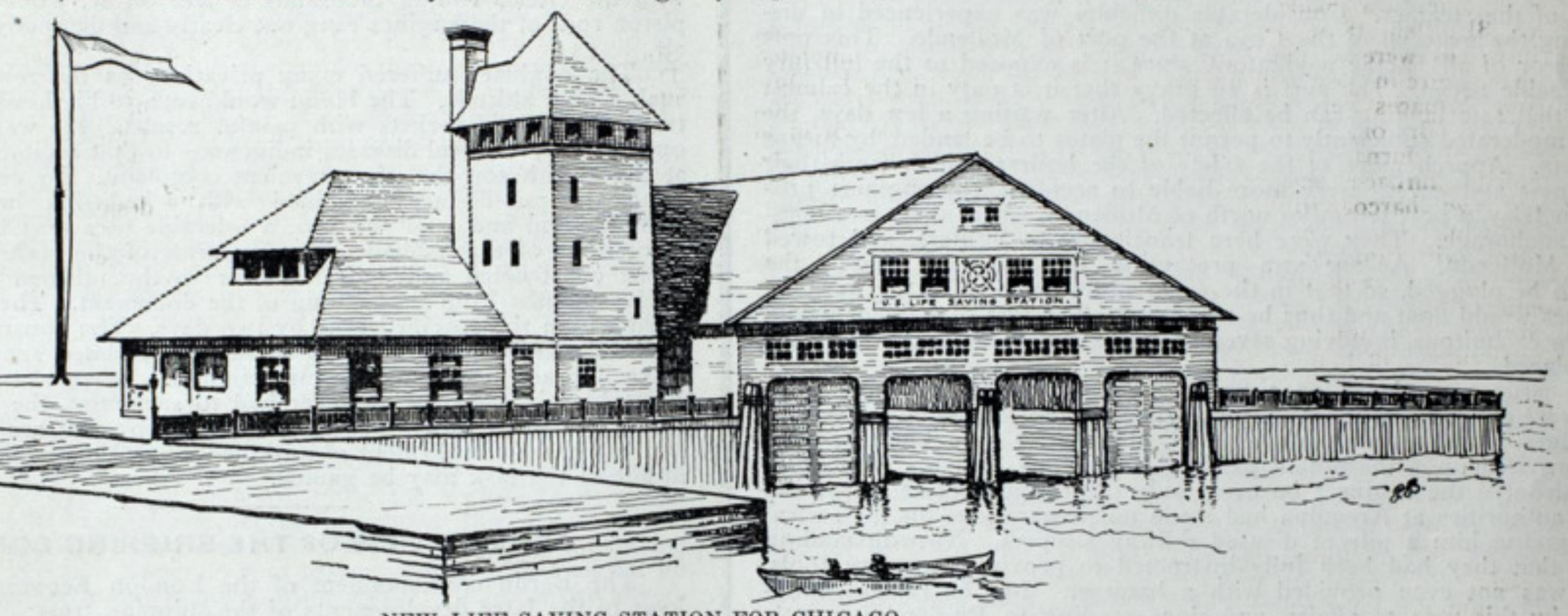
Baltimore, July 23.—On Thursday last might have been seen on the Chesapeake a sight probably never paralleled in this country or elsewhere. On the government measured course off Barren island were two vessels undergoing an official standardizing trial at the same time, both of which were built by the same firm, the Maryland Steel Co. One was the 12,000-ton freighter Tremont, a sister ship to the Shawmut of the Boston Steamship Co.'s fleet. The other was the torpedo boat destroyer Whipple. The Tremont made a speed of 13.88 knots at a mean draught of over 19 ft. and immediately started for New York, going through a four-hours' speed trial on the way.

The Whipple completed her standardization trial, making over the required 28 knots, and on the next day made an hour's endurance run at a speed of 27½ knots.

After the hour's endurance run the Whipple went again over the measured mile at the rate of 30¼ knots.

NEW-LIFE SAVING STATION AT CHICAGO.

Work has been commenced upon the construction of the life-saving station at the mouth of the Chicago river, which is to replace the old station under the name of "Old Chicago" life-saving station. The location is in the inner angle between the south pier of the river and the harbor breakwater. The building will contain accommodation for four boats of various sizes up to 35 ft. in length, and a complete and comfortable house for the keeper and a crew of about eight men. The station will be built upon a wharf adjoining, and level with the pier and the breakwater, and measuring 75 ft. east and west by 175 ft. north and south. The wharf will be very substantially constructed, the material being most all oak. There will be four openings left in the wharf to form harbors for the lifeboats, each opening about 10 by 40 ft., facing westward into the harbor. These four harbors will be separated by narrow galleries and covered by the boathouse, which measures about 50 by 60 ft. Four large sliding gates will close the harbors. The boat house will be two and one-half stories high, containing on the second floor one large room and eight small rooms for the crew. Adjoining the boathouse will be an office, a kitchen and a large messroom on the first floor, and three chambers on the second floor. A large lookout tower will adjoin the building within which are to be the main stairs, toilet rooms and the watch room of the station.



NEW LIFE-SAVING STATION FOR CHICAGO.

The building will be constructed in a simple but substantial manner of the best material available; the framing to be white pine or spruce; the exterior, cedar shingles with white pine trimming; the interior to be plastered (except the boat room), with trimmings of white pine woodwork, hard-oiled. The floors will be of maple.

TRADE WITH THE AMERICAN COLONIES.

The noncontiguous territory of the United States now furnishes a market for $50,000,000 worth of the products of her people. A statement just prepared by the treasury bureau of statistics shows that the shipments from the United States to its noncontiguous territory during the fiscal year just ended have been, in round terms, as follows: To the Hawaiian islands, $20,000,000; to Alaska, $15,000,000; to Porto Rico, $10,000,000; to the Philippines, $5,000,000; total, $50,000,000.

This is practically five times as much as the exports to those territories in 1897 when none of them, except Alaska, was under the American flag. The exports to Porto Rico in the fiscal year 1897, for example, were $1,988,888, and in the fiscal year 1902 they were over $10,000,000, the exact figures for eleven months being more than $9,500,000. While the figures for the twelfth month have not been received, it is certain that the total will exceed $10,000,000. To Hawaii our exports in the fiscal year 1897 were $4,690,075, and for the fiscal year 1902 the best estimate of the customs authorities is, in round terms, $20,000,000. Exact figures of the shipments to Hawaii are not at present available, but it is known that the shipments from Hawaii to the United States during the year will amount to about $23,000,000, and it is believed that the estimate of $20,000,000 for our shipments to the Hawaiian islands, is a conservative one. To the Philippine islands our exports in the fiscal year 1897 were $94,597, and in the fiscal year 1902 will be over $5,000,000, exclusive of shipments made by the government for use of its troops or other officers in the islands. To Alaska, the best estimate obtainable of the shipments in 1897 is $3,924,000, while those for the fiscal year just ended are estimated by the customs authorities at $15,000,000. This would make the grand total of shipments from the United States to its noncontiguous territory $50,000,000, exclusive of goods sent by the government for use of the army or of its officials.

In imports from the islands the increase has not been as great as that in exports. The total value of our imports from Porto Rico in the fiscal year 1897 was $2,181,024, and in 1902 will be about $8,000,000. From the Hawaiian islands the imports in the fiscal year 1897 were $13,687,799, and the total for 1902 will be about $23,000,000. From the Philippines the imports in the fiscal year 1897 were $4,383,740, and for 1902 the total will be over $7,000,000. The value of merchandise, including gold and silver, received from Alaska in 1897 is estimated at $5,000,000, and for 1902 about $15,000,000, making the total imports of 1897 from Porto Rico, Hawaii, the Philippines and Alaska about $25,000,000, while the total for the fiscal year 1902 will be about $50,000,000.

The bureau of statistics has just received its first record, under the new law, of shipments to Alaska. Formerly no statistical record was made of the shipments to and from Alaska, which was a customs district of the United States and treated as such in the commercial reports of the custom houses. During the last session of congress, however, a law was enacted applying to trade between the United States and its noncontiguous territory the provisions of the law relating to the collection of statistics of foreign commerce, and this will enable a complete record of the movements of merchandise between the United States and its noncontiguous territory. It is in compliance with this law that the first record of the shipments to Alaska is now in the hands of the bureau of statistics. The shipments from Seattle alone during the month of June amounted to $774,000. Among the more important articles shipped from the United States to Alaska were cattle, horses, flour, oats, railway cars, coal, eggs, gunpowder, hay, builders' hardware, machinery, fresh beef, milk, refined sugar and vegetables.

BIG SHIPS BUILDING ON THE DELAWARE.

Philadelphia, July 23.—Two of the largest vessels ever built in the United States have just been started at the works of the New York Ship Building Co. The keel blocks for both are down, one inside, the other outside the company's great sheds. The one inside the sheds occupies space required for two ordinary vessels, and for the one outside special ways have been built. These two giant vessels, names for which have not yet been chosen, are for the Atlantic Transport Co. and when completed are intended for service out of New York. In size they are each 620 ft. long, 65 ft. wide and 51 ft. 3 in. molded depth. They are to have an indicated horse power of 12,000 and gross registered tonnage of 14,000, with speed of 15 knots.

The Cramps have just received a contract to build for the Central Railroad of New Jersey a steamer for service between New York and Sandy Hook. The dimensions of the new vessel will be: Length over all, 308 ft.; length on water line, 298 ft.; beam, 52 ft.; draught, 11 ft. She is to be finished by May, 1903. She will have a torpedo boat stem on account of the shallow water in Sandy Hook bay. Her speed is to be about 25 knots, as she is to make the trip to Sandy Hook in about an hour.

The Texan, third vessel built for the American Hawaiian Steamship Co. by the New York Ship Building Co., and fourth vessel to be launched from the yards in Camden, will be launched during the week between August 7 and 14. This vessel, larger than her predecessors, the Nevadan and Nebraskan, is 484 ft. long, 57 ft. wide and 42½ ft. molded depth. Her indicated horse power is 3,400 and she is to have a speed of 10½ knots.

The torpedo-boat destroyers Chauncey, Barry and Bainbridge, built by the Neafie & Levy company, are lying at dock awaiting a supply of Pocahontas coal before final trials are run over the Chesapeake course.

The New York Ship Building Co. has secured contracts for two new oil steamers of 1,200,000 gallons carrying capacity each, for the J. M. Guffey Petroleum Co.

Officers of the American Boiler Manufacturers' Association, elected at the fourteenth annual convention, held this week at Atlantic City, are as follows: President, John O'Brien, St. Louis; secretary, J. D. Farasey, Cleveland; treasurer, Joseph Wangler, St. Louis; first vice-president, Robert Monroe, Jr., Pittsburg; second vice-president, Samuel Borger, Columbus; third vice-president, J. M. Robinson, Boston; fourth vice-president, M. F. Cole, Newman, Ga.; fifth vice-president, J. F. Casey, Chattanooga, Tenn. The next annual convention will be held at Chattanooga. The date will be decided upon by the local committee, and all members and others interested will be duly notified.

Rear Admiral Bowles has recommended that the contract price for vessels be divided into fifty instalments, and that the government retain the last three until the vessel is accepted.

An electric traveling crane, to cost $90,000, is to be installed at the New York navy yard. The general specifications are to be completed by Aug. 1.

A STEAMBOAT ABOVE THE CLOUDS.

The English correspondent of the Scientific American writes that the Andes of Peru are remarkable on account of engineering achievements, especially on the section of railway stretching from the port of Mollendo on the Pacific coast to Lampa, and Puno on the banks of Lake Titicaca, the highest known sheet of water in the world. It is 13,000 ft. above sea level. This inland lake measures 120 miles in length and varies from 25 to 40 miles in width. For many years communication was desired between the terminus of the railroad at Puno and the terminus of the railroad at Chiliaya in Bolivia on the opposite shore of the lake some 100 miles away. The traffic between the two termini was maintained by means of the primitive native balsas, constructed out of the totora grass which thrives on the muddy banks of the lake. But the exigencies of the increased traffic necessitated a more expeditious and economical means of communication, and so the Peruvian corporation which controls the railroad resolved to establish a steamship upon the lake to ply between the ports.

The contract for the steamer was placed with Messrs. Denny Bros., the celebrated ship builders of Dumbarton on the Clyde. The vessel is a twin-screw, shallow-draught steamer, 170 ft. in length, beam 26 ft., and 550 tons gross, with accommodation for forty-five first-class and thirty second-class passengers. Owing to the lake shelving gradually from the shore, it was rendered expedient to have the craft of very shallow draught in order to approach the landing stage. The vessel, named the Coya, was temporarily erected upon the Clyde, but not launched. She was then dismembered and shipped at Glasgow to Mollendo. To facilitate transport, the parts of the vessel were made as small as possible. The boilers, however, owing to the great care that has to be exercised in riveting the plates together by hydraulic pressure, so that there can be no possibility of their exploding, were shipped intact, and that constituted the heaviest and most bulky portions of the cargo, since they weighed fifteen tons each. The Coya was despatched to Puno under the superintendence of Mr. John Wilson, a young engineer who had served his apprenticeship with the builders of the steamer. Considerable difficulty was experienced in disembarking the material of the Coya at the port of Mollendo. This port is the terror of all Pacific navigators, since it is exposed to the full fury of the Pacific ocean. The surf is so heavy that it is only in the calmest weather that safe landing can be effected. After waiting a few days, the weather moderated sufficiently to permit the plates to be landed, by means of lighters. Apprehensive of the safety of the boilers, which from their unwieldiness and weight were more liable to accident, the engineer proceeded to Islay, a port ten miles north of Mollendo, where there is a magnificent anchorage. They were here transferred to lighters, and towed back to Mollendo. As an extra precaution, the engineer caused the boilers to be plugged, so that in the event of an accident to the lighters, the boilers would float and thus be recovered. The loss of a boiler would have been calamitous, involving several months' delay before it could have been replaced.

The cargo was placed on a train of twenty-two freight cars. The boilers were carefully lashed down to obviate oscillation and collision with low bridges. When Puno was reached, a primitive ship building yard was improvised upon the potato patch of a Quichua Indian. Difficulties now confronted the engineer on every side. For some occult reason the railroad authorities at Arequipa had made no preparations for his arrival beyond giving him a pile of disused railway sleepers. Notwithstanding the fact that they had been fully instructed to provide necessary tools, Wilson was not even provided with a hammer. But he remained undaunted by this turn of affairs, and since sending to England for tools would have involved several weeks' delay, he set to work to fashion a few tools from scrap iron that he discovered. The railway sleepers he cut up and used as keel dogs.

The railroad authorities supplied some riveters from the locomotive shops at Arequipa. The natives who assisted in the work, although slothful, possessed a certain amount of intelligence. Flush riveting was unknown to them, however, and some time elapsed before they became sufficiently expert to render much valuable assistance. Trouble was experienced with the "ne'er-do-wells" of the country, called Gringoes, who hastened to the scene from all parts of the country, not to work, but to see how much material they could appropriate for their own special use. Some idea of the arduous nature of the engineer's task may be gathered from the fact that in the forty laborers he employed, sixteen different nationalities from all parts of the world were represented.

In selecting the ship yard care had to be taken to select a suitable spot for launching. Under ordinary conditions the launching ways are laid at low tide, so that at high water the lower ends are sufficiently submerged. In this case, however, he had no assistance from tides. Fortunately, at the time of the year he arrived the lake was low, so that when the rainy season raged the water would rise a few feet. But even this would not have supplied a sufficient depth of water at the end of the ways, and they were further submerged by means of heavy weights attached to them. The stocks for the vessel consisted of the timber utilized by the railroad for the erection of their bridges, and they were placed as near the water's edge as possible. The construction of the vessel's hull progressed very rapidly after the laborers had been initiated into the work of flush riveting. The boilers were really the only difficult portion of the Coya to handle. As a rule the machinery is not installed in a vessel until after launching, but this course in this instance was absolutely impracticable, owing to the absence of any kind of lifting appliances. The engineer was unable to obtain a crane, and also could not improvise a derrick, owing to absence of tall trees in that high altitude to furnish sufficiently long lengths of timber. He finally surmounted the difficulty by purchasing the spars from an old sailing vessel in Mollendo port, which the master of the craft only parted with at a high figure, since he had gained news of the engineer's difficulty. The boilers were each about 16 ft. in length by about 8 ft. in diameter, and were moved forty yards from the freight cars to the vessel's side by sheer physical labor. The hauling of the boilers into the vessel by the primitive crane was an exacting operation. The condenser weighed five tons. The cylinders and the various parts of the machinery were not installed until after the launch.

Some idea of the rapidity with which the steamer was built may be gained from the fact that within six months of the arrival at Puno the Coya was ready for launching. The launch was an anxious operation to the engineer, because even in the best equipped ship yards a certain amount of uncertainty attends this operation. The engineer more than anticipated failure upon the first attempt, notwithstanding the infinite care he had exercised to avoid any hitch. The launching ceremony was the occasion of great festivities in the city of Puno. About 5,000 Indians also witnessed the function. The christening was performed by the Bishop of Puno. After the short religious service holy water was sprinkled over the bows and a bottle of champagne broken in the conventional style. Immediately this was completed, the engineer pulled the trigger maintaining the cradle in position, and instantly the Coya glided with increasing momentum into the water. No launch in the most modern ship yard could have been attended with greater success than the launch of the Coya.

With the launch of the vessel the most arduous part of the undertaking was completed. The Coya was towed to and berthed alongside the mole at Puno, where the rest of her machinery and cabin fittings were installed. The sight of a steamship floating upon this lake occasioned considerable astonishment among the unsophisticated Indians, many of whom had never seen the sea, and consequently had never seen a steamship. The trial trip of the steamer was the occasion of a general holiday in the city. The contract speed of the vessel was to be 10 knots per hour, and she was to cover the journey between Puno and Chiliaya in ten hours. The vessel was captained by a Peruvian, who had to be initiated into the work of the telegraph apparatus connecting the bridge with the engine room, while Mr. Wilson accompanied the vessel as engineer. One difficulty that was experienced was in connection with the stoking of the furnaces. Owing to the rarefaction of the atmosphere at this high altitude there was a decreased supply of oxygen, which necessitated stoking the furnaces in small quantities, or else the fires were smothered. This required continual labor, which was exceedingly fatiguing. Forced draft was of course applied, but this did not alleviate the difficulty to any appreciable extent. The steamer was also supplied with the apparatus necessary for petroleum fuel. The engineer described the experience of traveling at such an altitude as peculiar. The air was extremely clear, with the clouds rolling thousands of feet below, while the throbs of the piston rods of the engines rang out clearly and distinctly upon the rarefied air.

The engineer suffered many privations as the result of working at such a high altitude. The blood would rush to his head and his eyes protrude from their sockets with painful results. He was also seized with one of the epidemical diseases indigenous to that region, and was troubled at times with soroche, the prevalent complaint. By conceiving a severe attack of mal-de-mer combined with a splitting headache, a quasi-asphyxiation, and land sickness, a tolerable idea may be obtained of the painfulness of this malady. By the terms of the contract the Coya was to be constructed and delivered over to the railroad authorities within twelve months from the signing of the document. The contract was fulfilled within the specified time by two days. The construction of a vessel of the dimensions of the Coya in such an isolated spot as the shores of Lake Titicaca is an engineering triumph. When one recollects the insuperable obstacles the engineer had to surmount, the absence of any of those appliances with which the modern ship yards are provided to facilitate work, the employment of unskilled labor, then some idea of the magnitude of the task may be gained.

GERMAN VIEW OF THE SHIPPING COMBINE.

The Berlin correspondent of the London Economist writes as follows of the later developments of the shipping trust: "While the agreement is regarded as highly favorable to the German lines, the prospects of the syndicate itself are not considered as bright. It is believed in German shipping circles that the syndicate is too heavily capitalized and that it will consequently be unable to earn enough money to pay dividends upon its enormous capital after making the necessary write-offs for vessels. In this connection a very pessimistic estimate of the probable financial results of the syndicate has appeared in the Frankfurter Zeitung, and has attracted much attention here. It is understood that this estimate emanates from a financier very near one of the German lines. He compares the probable earning capacity of the trust with the actual results obtained by the two German lines for several years past, as follows: The trust, having a capital of about £35,000,000, must earn £3,500,000 a year in order to pay a dividend of 5 per cent., and write off 5 per cent., which latter is regarded as the lowest possible allowance for depreciation of steamers. But in order to obtain so favorable a result, the trust, having a tonnage of about 700,000 tons, will have to earn, roughly, £5 per ton yearly. On the other hand, the two German lines, having for several years past an average of about 900,000 tons together, have only been able to earn about £2 10s. per ton. They have undoubtedly been under excellent management, and the state of the ocean freight market was unusually favorable till the latter half of last year; and it is regarded as quite impossible that the trust, with its 700,000 tons, should earn twice as much as the German lines with their 900,000 tons."

HYDRAULIC DREDGE J. ISRAEL TARTE.

The new hydraulic dredge, J. Israel Tarte, built by the Polson Iron Works, Toronto, Can., from designs by A. W. Robinson of Montreal, has been most successful in its initial employment. The hull is of steel, 160 ft. long, 42 ft. wide and 12 ft. 6 in. deep, and the indicated horse power of engines is 1,500. The depth to which it can dredge is 50 ft. The dredge is intended to work in blue clay and to have a lateral feed of 450 ft., the movement being controlled entirely by wire rope anchorages. Material is discharged to a distance of 2,000 ft. by a floating pipe-line of steel, 36 in. in diameter. The material is excavated by Robinson's patent rotary cutter, which excavates the material and feeds it into the mouth of the suction pipe, the main centrifugal pump being used entirely for the transportation of the dredge's material. This dredge is now at work deepening the ship channel between Montreal and Quebec in the St. Lawrence river. The channel through the clay deposit of Lake St. Peter is 18 miles long and the present depth is 25 ft. at low water, 300 ft. wide. When the present work is finished the channel will be 30 ft. at low water, 450 ft. wide. The original depth of water in the lake was 11 ft. at low water. This dredge has been built for and is operated by the department of public works of Canada under the direction of the Hon. J. Israel Tarte.

DRY DOCKS—THEIR ORIGIN AND DEVELOPMENT.

Parker H. Kemble in the Boston Evening Transcript.

The use of iron and steel in ship building, requiring as it does constant attention to avoid corrosion, has made the dry dock a more necessary adjunct to a modern ship than ever before. When ships were small, in the infancy of the art of building, they were hauled up on a shelving beach on all occasions when needing repairs or when not in use, as is still the custom with the French and English fishermen with their smacks and luggers. As, however, they increased in size they became too unwieldy for such rough and ready methods, and were beached at high tide to be worked on during the short space of time they were dry at low water. Where the coast permitted a narrow cove running well inland and sheltered was chosen, and there, supported by ropes from the masts to either shore, with a hard, sandy bottom to rest on, the germ of the dry dock began to develop. Some lazy genius objected to losing his night's sleep if the tide happened to be low too early in the morning and conceived the idea of damming the mouth of the cove when the tide was out—and there was a dry dock.

When dry docks were scarce and vessels had no machinery as engines and boilers that would break loose, careening was a favorite method of getting at a ship's bottom. This consisted in hauling the ship down on her side by means of ropes fastened to the mastheads and to heavy anchors on shore until the keel or center timber on the bottom was out of water. When the work on that side was finished the vessel was righted, turned round, and the operation repeated for the other side. This method possessed the advantage of requiring no stationary machinery, as all the requisite apparatus, anchors, ropes, etc., were carried by the vessel herself for everyday uses. In looking over the logs of both old merchant and navy vessels it is not unusual to find entries of careening on the coast of Africa to repair copper or plug a leak. Before the almost universal use of iron and steel for ship construction the more usual method of getting at the bottom of a vessel was by means of the sunk or graving dock. This is a hole in the ground lined with some water-excluding material such as wood, stone or concrete, any or all, furnished with means of access to a navigable waterway which can be closed when it is desired to pump the water out, and provided with pumps to remove the water when the gates are closed. For constructive reasons the dock is made wider at the top than at the bottom, and for convenience of access and shoring vessels the sides are made like a continuous flight of steps called altars.

The gates open outward, and when closed form a broad V with the point towards the outside, so that the pressure of the water on the outside when the dock is empty only closes them the tighter. A modern method more prevalent at present employs a caisson instead of gates. This is a single hollow gate made thick enough to float itself when it is empty. When it is wished to close the dock it is towed across the entrance, and by admitting water sunk into grooves made for it, and when the water in the dock is pumped out the outside water presses the caisson onto its seat with force enough to make a water-tight joint.

On the bottom of the dock are three rows of blocks for the vessel to rest on. The center ones are fixed and are called keel blocks; those on either side are made to slide in or out by means of ropes so as to fit against the bottom of the ship near the sides. These are called bilge blocks. In order to have room to work under the bottom these blocks are usually made 4 ft. high, experience having shown that a man cannot do efficient work with less space, and higher blocks increasing the danger of accident to the vessel. Concrete is at present the favorite material for graving docks where economy is not a prime factor. It has many advantages over granite or masonry, both in expense and ease of construction, and while more expensive than wood, its superior durability warrants the greater initial outlay where the capital can be obtained.

From its nature as an outside or containing vessel a graving dock must exceed in all its dimensions the largest vessel it is intended to handle. For naval vessels alone a length of 550 ft. for cruisers, a breadth of 78 ft. for battleships and a draught of 28 ft. is required by vessels now under way or projected. For merchant ships the dimensions of breadth and depth would be sufficient, but that of length would have to be extended beyond 700 ft. to accommodate existing ships, and 750 ft. would be as short as safe to make it, in view of the present tendency of dimensions. As, however, a modern navy includes in time of war the use of merchantmen as auxiliary cruisers, they would need to be considered. This gives us then a length of 750 ft., a beam of 78 ft. and a draught of 28 ft. to be arranged for. For width 10 ft. on either side must be allowed for light, air and access; and owing to the shape of the midship section of the present type and the prevalence of bilge keels this width must be that of the bottom of the dock.

When we come to the depth the conditions are more complex. A merchant vessel drawing 32 ft. loaded will draw in the neighborhood of 20 ft. light, so that even if damaged and partly filled with water there is a margin enough in a 28-ft. depth. With warships, however, the case is different. Our battleships average about 28 ft. when fully loaded for sea, and a result of battle in the shape of an increase of 5 ft. is quite possible and should be guarded against. Then, again, there is the tide question. Imagine a badly crippled vessel waiting for high tide to get into dock, with the possiblity of sinking while waiting. With a rise and fall of 9 ft. in Boston harbor it would not be practicable to allow for the whole tide, but a 3-ft. allowance should be made, which would give a depth at high water of 36 ft. over blocks, or a depth below mean high water to bottom of dock of 40 ft. We have then the following for a fist-class graving dock: Length, 750 ft.; breadth on bottom, 98 ft.; total depth below high water, 40 ft.; at entrance, 36 ft. The entrance should be nearly the full width of the dock proper, as with bilge keels a very small list would prevent entrance. The construction of a dock of this depth would be of the greatest difficulty. For structural reasons, out of place here, it would be a task in any but the best of soil impracticable, if not impossible.

The floating dock undoubtedly is derived from the pontoon, and the origin of the latter can be carried back to the primitive age when our forefathers found one log insufficient to carry their cargo, and put another on either side. In early history the use of pontoons in getting deep-draught war vessels over shallow bars at river entrances is mentioned. In a very old book on marine construction in the possession of the writer, there is a print showing a vessel supported between two pontoons by means of ropes passing underneath the keel and tightened by windlasses on the pontoons. These are provided with valves for the admission of water, and with pumps for its removal. The descriptions in quaint old French call it a "chameau," and go on to tell how it was used by the Hollanders to take heavily laden ships over the shallows to where they could continue their way to Amsterdam.

The two pontoons were towed out to the vessel, partially sunk by admitting water; the ship hauled between them; the ropes under the keel tightened till the pontoons, which were roughly shaped to the form of a vessel, came alongside, then the pumps were started and the whole combination rose enough in the water to pass over the shallows, where a reverse operation restored the ship to her independence. The first few pages of this book are unfortunately missing, having been devoured by some rodent with a taste for literature, but from the text, the date of publication appears to have been around 1700. If in this old machine you substitute a third pontoon for the ropes joining the two sides together, you have a floating dry dock.

A floating dock of today is designed and built under the same rules and theories as a vessel as regards stability or ability to stand up, and strength. The more generally used type for large docks consists of two sides about four-fifths the length of the dock, and three bottom pontoons, one long one in the middle and a short one at either end. These are all rigidly joined together, and rise and fall as one. The function of the sides is chiefly steadying and controlling, although they exercise some lifting power, but the main lifting force of the dock lies in the bottom pontoons.

Engines, boilers and pumps are stowed in the sides, and the ingress and egress of water to all the various compartments is controlled from one room, where the whole control of the dock is centered. The machinery outfit usually includes as well as pumps, and electric light plant, capstans and windlasses, an air compressor and various pumps for washing of the dock or pumping out ships' tanks. The method of use is the same as described for the pontoons except, of course, that the ship rests on keel and bilge blocks instead of on ropes. The advantages of the floating system are many. First of all the site. The excavation required is not greater than that for a graving dock even if harbor space is not available and dry land has to be encroached upon. It needs no expensive lining or foundation as required by a graving dock. Greater speed of construction while the dock is building at a shipyard. As a graving dock may be likened to an oblong box without a cover, so a floating dock may be likened to the same box with the ends removed. The result is that the length of the ship to be lifted is no longer governed rigidly by the length of the dock. The model and construction used in the modern vessels allow considerable overhang of ship unsupported at either end, and for a 700-ft. ship a floating dock 560 ft. long would be ample.

The beam of a floating dock is, of course, fixed, but as structural reasons allow the sides to be made straight instead of sloping, as in the graving dock, this can be made wide enough without difficulty. Draught of water is simply a matter of dredging and height of sides and presents no great difficulties, as the extra expense of building up the sides a foot or more and dredging the bed is the small side of the extra masonry and foundation for the other dock. While an excess of an inch in draught would bar a vessel from a graving dock, if the water were smooth a floating dock could be, under stress, sunk 10 or 12 in. more without danger. And the latter is, of course, independent of tide. The floating dock has one absolute limitation, and that is lifting power, which the other does not possess. If the ship weighs more than the capacity of the dock it cannot be lifted out. It may, however, be lifted part way, and a dock that could not lift a vessel for a patch on the bottom could lift her enough to slip in a new shaft. Should a ship have a list the dock may be listed to suit, and when the ship is firmly on the blocks, dock and all are straightened up. There is a source of economy in the floating system due to the fact that only an amount of water equal to the weight of the dock plus the weight of the ship needs to be pumped out. In the graving dock the amount of water is greatest when the dock is empty, and least with the largest ship. As a consequence, only about one-third the pumping power is required in a floating dock of like capacity. The connections between the bottom pontoons and the sides while rigid are made detachable, and by unfastening any one of the bottom sections it may be docked by the other two, while the bottom of the sides may be reached by letting in water to the opposite side, thus careening the dock. The dock is thus self-docking, and any part may be reached at any time. The following dimensions are of two of the largest floating docks in existence:

U. S. N. floating dock at Algiers, La.—	
Length over all....	525 ft.
Breadth over all....	126 ft. 2½ in.
Breadth between walls	100 ft.
Depth over sills....	28 ft.
Height of keel blocks	4 ft.
Lifting power .....18,000 tons.	

British government dock at Bermuda—	
Length over all....	545 ft.
Breadth between walls	100 ft.
Depth over sill.....	33 ft.
Lifting power .....15,000 tons.	

There are other systems of reaching the bottoms of vessels, notably the marine railway, which is the development of the hauling up the beach method. It consists of a slanting track running from a little below the maximum draught to be lifted, up onto the shore above high water mark. On this is a car or cradle which is lowered into the water, the ship floated over it and both pulled out together. It is applicable only to relatively small vessels.

A very ingenious form of dock is that built by the Union Iron Works, San Francisco, the builders of the Oregon. An excess of mud and other local considerations rendered a graving dock undesirable and with characteristic independence they built a dock which is in fact a big hydraulic elevator. A platform 436 ft. long, 65 ft. wide, and with 22 ft. of water over the keel blocks at high tide, capable of taking a ship weighing 6,000 tons, is bodily lifted up above water by a row of hydraulic rams placed on either side of it. It has been a great success, having been in continuous service some fifteen years.

The Baltimore, Chesapeake & Atlantic railway is preparing plans for a new excursion steamer to run on the route between Baltimore and Claiborne. The new steamer will be about 200 ft. long and will have capacity for 1,500 passengers.

HISTORY OF GRAIN ELEVATOR BUSINESS AT BUFFALO.

Written for the Marine Review.

Buffalo, N. Y., July 23.—On the 18th of the present month the last two floating elevators in Buffalo caught fire, and one of them was totally destroyed. The condition of the other is such that there is no hope of ever using it as an elevator again. At the time of the fire the island to which the floaters were tied was covered with wrecks of old elevators which for some months have been undergoing complete destruction. The whole scene was one of utter desolation, and fitly represented the condition of the canal elevators of Buffalo.

The elevator business of Buffalo may be divided into two periods—the first the period of canal supremacy, the second the present time of railroad control. For it must be understood that prior to 1889 the canal always took out of Buffalo over half of the grain received here, while since that year there has never been a season, excepting 1894, when the railroads have not done more than the canal. So far has the change gone that for the years 1900 and 1901 the canal took only about 10 per cent. of the business. This great change in shipping has naturally led to changes in the elevating business. Where elevators having only canal facilities were valuable before, at present they are of no use. To command a paying business an elevator must have railroad connections. There has been another change in the business, brought about by the change in the size of lake vessels. Since 1890 the continually increasing size of the vessels has put out of business many of the smaller elevators, which could handle and store several small cargoes but which cannot hold one modern cargo.

BUFFALO THE HOME OF THE GRAIN ELEVATOR.

Bearing these facts in mind, the changes at the port of Buffalo in recent years become more easily understood. As far back as 1856 there was an association of elevators under the name of the Western Elevating Co. and that association has existed, with some breaks, ever since. Buffalo is the home of the grain elevator, as the first steam-driven elevator in the world was erected on the site of the present Bennett in 1842. Besides being the home of the elevator, Buffalo has some claim to the honor of originating the first commercial combination in the country.

Joseph Dart, builder of the first elevator, writing in 1865, says of the early business at Buffalo:

"Already, with the near 2,000,000 bushels received in 1841, unavoidable delays in the transhipment of grain were frequent, and were the occasion of much vexation and expense. Up to this time, the universal method of transfer was to raise the grain from the hold of the vessel in barrels, by tackle and block, to weigh it with hopper and scales swung over the hatchway of the canal boat, or carry it into the warehouse in bags or baskets on men's shoulders. This method, even at this present day, is largely in use in the cities of New York, Philadelphia, Baltimore and Boston, which illustrates the force of habit, as a small army of men man be seen with baskets on their shoulders, unloading vessels, at an immense cost of muscle and time, to say nothing of pecuniary loss. Only 10 or 15 bushels were commonly weighed at a draft, and the most that could be accomplished in a day, with a full set of hands, was to transfer some 1,800 or 2,000 bushels, and this only when the weather was fair. Everything was at a stand in bad weather, and on an average one-fourth of the time was lost by rain or high winds. The harbor was often crowded with vessels wating for change of weather. In these circumstances I determined, in 1841, to try to use steam power in the transfer of grain for commercial purposes."

The old wooden elevators of the early years were built mostly for canal delivery, and to store cargoes averaging about 15,000 bushels of grain. Fire was their worst enemy, as there were many dryers connected with elevators in those days, on account of the large number of damaged cargoes which the small schooners brought in to the port. From these dryers fires were often started, and the death rate of elevators in those days was high. This was a good thing, as it gave an opportunity for rebuilding in more modern style. As the cargoes grew larger and the boats more secure against damage, these dryers were abandoned, until today there is not one left in connection with an elevator.

THE FLOATERS AND SMALL TOWERS.

This early time was also the time of the floater. While the canal business was at its height, a floating elevator could transfer grain from the small lake vessel to the canal boats as well as a large shore elevator. In consequence, there were many of these floaters built, and since they cost so much less than the shore elevators, and could make just as much money at some times of the year, the storage elevators found it was necessary to control them. Many a fight in the old Western Elevating Co. arose over the shares to be allowed to a floater, and many a fight which lasted for months and cost the elevators large sums of money was waged between the storage elevators and the floaters.

Akin to the floaters were the small towers, with little or no storage room, being transfer machines on land instead of on scows. These towers were also a thorn in the sides of the larger elevators, for both towers and floaters could handle grain, and could do everything but store, and it was only in the fall that there was any demand for storage. These small pirates thus skimmed the cream off and left the more expensive and poorer paying work for the more expensive houses. An elevator could earn at the price charged before 1870 (2 cents a bushel for elevating) from $250 to $500 a day by elevating, while storage only paid ¼ of a cent for ten days. The profitable work was thus in elevating, and only those firms or companies built storage which required room in case there was delay in getting canal boats. Other folks took chances or held the vessel, and a vessel's time was not so valuable then as it is now.

As the boats grew larger, the old elevators were put out of business, and as the canal business died out, the elevators that had only canal facilities became valueless. Thus nearly thirty elevators have disappeared from the roll within the last few years in Buffalo, and today there are only about twenty working houses, including all the new ones, where there were fifty a few years ago.

The old association ran against its doom in 1897. In that year there were three new elevators built. Rates were, and had been since 1881, seven-eighths of a cent a bushel. There had been some agitation for lower rates, but the executive committee of the association, after listening to petitioners, had some little time before decided not to grant the decrease. At about the same time, three separate interests decided that Buffalo elevators were pretty good property, and the Electric was built, of steel, by the New York grain firms of Kneeland & Co. and Power, Son & Co. Long before the Electric was finished, the Chicago firms of Bartlett, Frazier & Co. and Armour & Co. had completed a wooden house, the Export, and in September the Great Northern elevator, a steel structure with the largest capacity in Buffalo, was finished by the Great Northern interests. Facing this situation, the Western Elevating Association held a meeting and decided to dissolve with the end of their year in April, 1898. Negotiations were dragged along until June of that year, however, before the old association finally gave up the fight, and the rates went to nothing. For the balance of the year it was a game of catch-as-catch-can, and the vessel was the principal sufferer, having to wait for busy houses while there were often many elevators lying idle.

VESSEL OWNERS FORCED FORMATION OF AN ASSOCIATION.

A call was issued for a meeting of the Lake Carriers' Association at Buffalo in March, 1899, and it was proposed at the meeting to fix up a bill of lading which would make it impossible to hold vessels so long as any elevator was idle. This would prevent some of the railroads from handling their grain through their own houses, as they were not in possession of enough storage room to keep up with the business during the rush in the fall, and so this move of the Lake Carriers brought about a new association. While the Lake Carriers were in session, a meeting of elevator men was held, and before the Lake Carriers adjourned it was definitely understood that an association would be formed.

The vessel interests have always contended that the association is of great benefit to them, and there is no room for discussion on that score. When the facilities of the port are placed at the disposal of every consignee, there can be no long delays to vessels except under circumstances of great congestion at all elevators. Consequently, the Lake Carriers can take to themselves the credit of having solved a most troublesome problem by their decided action. The new association was organized under the eye, so to speak, of the Lake Carriers, and it at once undertook work that the association had never done. Prior to 1899, the general office of the association had not distributed the cargoes. Vesselmen had to deal with each individual elevator in vain attempts to hurry the unloading of their ships. Beginning with 1899, however, the association placed all grain during busy seasons, taking charge of the port, and with full knowledge of the entire situation its officials have been able to expedite matters very much. Thus a great gain has come to the vessel interests, beyond their original expectation.

HISTORY OF SHOVELING CHARGES.

A point on which the vessels and elevators came into conflict many times was the question of the shovel charge. The history of this matter is very interesting and is a part of the history of the Buffalo elevators. Before 1882 there were two rates—one on sail vessels and one on steam. There was no difference in price for hand or steam shoveling, and the rates varied from $3 to $4 on sail vessels and from $4 to $5 on steam vessels. In 1882 the patent expired on the steam shovel and the royalty which had formerly been paid to the patentee was rebated to the vessel, thus making steam shoveling cheaper than hand by the amount of the royalty, 50 cents per 1,000 bushels. From 1882 to 1894 the rates were as follows: Hand shoveling $4 for sail vessels, $4.50 for steam vessels; steam shoveling $3.50 for sailing vessels, $4 for steam vessels.

Besides these rates there were other charges which made the life of the vesselman anything but pleasant. Every damaged cargo took a rate of from $5 to $10 per thousand, and the shovelers were the judges of the question of damage. Several vessels were also charged rates higher than the regular schedule on account of peculiar construction. All these things made it impossible to figure exactly in advance the cost of shoveling at Buffalo. In 1894 a strong effort was made by the Lake Carriers to obtain a reduction, and the elevators threw off 25 cents per thousand for steam shoveling on steamers. This reduction was brought about by the vessels refusing to pay for the use of the steam shovels. For a time the steam shovels were not used. The shoveling was done by hand at hand shovel rates. After about three weeks contention the 25 cents per thousand was agreed upon as a compromise settlement for the remainder of the season, with the understanding that the question would be taken up at the annual meeting of the Lake Carriers' Association.

When the Lake Carriers met in annual session a committee was appointed to arrange the matter. The committee made the first contract in the spring of 1895 with James Kennedy, by the terms of which the charge was to be $3.50 on everything. This contract was carried out so satisfactorily that it was renewed for the next year at the same rate, and for 1897 with the same contractor at $3.35. In 1898 W. J. Conners entered the field and the contract was let to him at $3.10. A renewal of this contract in 1899, and an attempt to reduce the pay of the men, led to the famous strike, which tied up the port of Buffalo for a month just as the new association was starting business. In the spring of 1900 a new arrangement was perfected, by which the Lake Carriers have a superintendent at Buffalo in charge of the shoveling, who collects the agreed rate from the vessels and settles with the men. Mr. Thos. W. Kennedy was made superintendent, and still holds the position. For 1900 the rate was $3.35. For 1901 and 1902 the rate was and is $3.30. Of this amount $2.00 goes to the men, $1.20 to the steam shovels furnished by the elevator, and 10 cents to the Lake Carriers, from which latter amount the superintendent's salary and expenses are paid. No arrangement has ever been so satisfactory to all parties concerned as the one now in vogue and the Lake Carriers have thus solved another problem of great importance to themselves.

The rates charged by Buffalo elevators for the past thirty years are as follows: Before 1870, 2 cents; 1870-74, 1¼ cents; 1875-80, 1 cent; 1881-97, ⅞ cent; 1898, ⅝ cent; 1899-1901, ½ cent; 1902, ½ cent.

SITUATION AGAIN DEMANDING ATTENTION OF VESSEL INTERESTS.

In the spring of 1900 the Western Elevating Association was not able to come to terms with Spencer Kellogg, owner of a half-million

elevator, and Mr. Kellogg withdrew his elevator from the association. Following this withtdrawal, the association made a contract with all the trunk lines of railroad between Buffalo and New York, by which the association was to do all the work for the railroads, giving them the facilities of the port, and in return the railroads were to pay the association ½ cent per bushel on all grain taken by them from Buffalo. As a result of this contract, Mr. Kellogg found when he tried to make through shipments from his elevator that the railroads would not pay him the elevating charge, on the ground that they were under contract with the association to do all their work. The Kellogg elevator could do business but the money earned by it was paid into the association. Mr. Kellogg immediately brought suits against the association and each of the trunk lines, charging criminal conspiracy. These suits came to trial in May, 1902, and Mr. Kellogg was non-suited. The real question as to the right of the railroads to make such an arrangement was not decided, as the case was thrown out on the ground that the conspiracy charged was not proven.

The present situation is peculiar. Two new steel elevators have been built, and the question of sharing has been so difficult this year that up to the present time (July 23) there has been no general association formed. There is every probability, however, that before long some agreement will be reached. If an agreement is not entered into shortly, the Lake Carriers will have another chance to show that they are determined not to have their business interfered with by other people's troubles.

It would hardly be right to conclude this brief history of grain elevator business at Buffalo without recognizing the efforts of a well-known Buffalo member of the Lake Carriers' Association, Capt. J. J. H. Brown, who has given up a great deal of time for many years past towards the betterment of conditions generally in the lake trade and to whom the vessel interests are especially indebted for reforms along the lines dealt with in this article. The reduction in grain handling charges of 25 cents per thousand bushels to steamers in 1894 was the first reduction obtained in a great many years, and it may truly be said that this reduction was due entirely to Capt. Brown's efforts. This was the beginning of further reductions and better methods of unloading grain at Buffalo, and it is understood, of course, that other ports on Lake Erie are governed largely, if not entirely, by Buffalo. The still greater reduction in the shoveling charge and improvement in methods, which followed in 1895 in the contract with James Kennedy, should also be credited to Capt. Brown, and it was through his efforts that the arrangement was made in March, 1900, to facilitate the unloading of grain here.

COAST SHIP YARD NOTES.

The Harlan & Hollingsworth Co., Wilmington, Del., has been given an order to lengthen by 40 ft. the steamer Parthian of the Philadelphia & Boston line. The vessel will be cut in half amidships, the sections pulled apart and a new section inserted. The cost will be about $150,000.

The Jackson & Sharp works of the American Car & Foundry Co., Wilmington, Del., launched last week for the J. W. Paxson Co. of Philadelphia a steam barge of the following dimensions: Length, 148 ft.; beam, 26 ft.; depth, 8 ft. The barge was christened Bennie.

The Morse Iron Works & Dry Dock Co., Brooklyn, N. Y., are busily engaged in converting freighters into oil carriers. The steamers at present undergoing this transformation are the Northern, Northeastern, Winifred, Northwestern, Northtown and Catania.

At the ship yard of John H. Dialogue & Son, Camden, N. J., work has begun on a sea-going steel tug for the Philadelphia & Reading Railway Co. The new craft, when completed, will be used in towing barges from Philadelphia to New England ports.

A three-masted schooner, the Alice M. Davenport, was launched from the yards of the New England Ship Building Co., Bath, Me., last Saturday. Her dimensions follow: Length, 154 ft.; breadth, 35.4 ft.; depth, 13 ft.

The Perth Amboy Ship Building & Engineering Co., Perth Amboy, N. J., has secured the contract to repair the Norwegian steamer Banes, which was wrecked through fire on the Cuban coast.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., has purchased the plant of the Peninsula Foundry Co. and will operate it in conjunction with the old Caskey plant.

The monitor Arkansas was given her dock trial by the Newport News company last week. Her builders' trial will occur in a few days.

The past week has brought a very considerable contribution to the prosperity of the iron trade in 1903. The activity has been most marked in pig iron, but it has also been sufficient in finished lines to give some of the mills a tonnage of new business exceeding the amount of their shipments. The announcement by the largest southern furnace interest that its books are open for 1903 orders, beginning with March, prices on a basis of $17 at furnace for No. 2 foundry iron, tells of the strength of the inquiry for forward deliveries that the furnaces have been meeting lately, as well as the extent to which in this instance the business booked for 1902 will lap over into the following year. Prices for next year are not uniform, as low as $16.50 and as high as $18 being quoted by southern furnaces for No. 2, while northern furnaces quote from $21 to $22 at furnace. There is a closer scrutiny than ever for signs that consumption will decrease in the near future because of the high price for iron, but none are plain enough yet to be catalogued, though the danger is very generally recognized. In the case of a number of pig iron producers, half their capacity for the first six months of 1903 is already sold; few have sold less than one-third their probable output in that period.—Iron Trade Review.

Further hearing of the case in which certain minority stockholders of the United States Steel Corporation seek to enjoin officials of that company from retiring part of the preferred stock by an issue of bonds has been adjourned until Sept. 5.

Jones & Laughlins, large steel manufacturers of Pittsburg, have increased their capital stock from $20,000,000 to $50,000,000. Large improvements are contemplated. The reorganization does not involve change of any kind in management.

AROUND THE GREAT LAKES.

Daly & Hanan, contractors of Ogdensburg, have been awarded contracts by the government for dredging the harbors at Charlotte and Olcott, Lake Ontario.

Maj. Gen. Gillespie, chief of engineers of the United States army, is now making a tour of the great lakes on the lighthouse tender Amaranth. He is accompanied by a number of engineers.

Capt. B. B. Inman, well known on account of long connection with harbor tug business at Duluth, has been appointed assistant superintendent of the Pittsburg Steamship Co. He will be stationed at the Sault.

The Northwestern Fuel Co.'s big coal dock at West Superior is to be doubled in size. Work on the second section will be begun as soon as the present section is completed. The dock will be 1,300 ft. long and 1,200 ft. wide.

Lake Carriers' water signals at the docks of Stanley B. Smith & Co. and the Pittsburg Coal Co. on the Detroit river now show a depth of water up to 18 ft. 6 in. It is considered safe for vessels to load to that draught but not deeper.

The Collingwood Ship Building Co., Collingwood, Ont., has just launched the large steel tow barge which they are building for the Algoma Central Steamship Co. of Sault Ste. Marie, Ont. Agawa is the name given to the new vessel.

It is understood that Chicago parties who have purchased the ship yard of Burger & Burger at Manitowoc are in no way connected with the Ship Owners Dry Dock Co. of Chicago or any other ship building organization already in operation. It is said that they have abundance of capital and that they will fit the Manitowoc works for the building of steel vessels on a moderate scale. Names of officials of the new company are withheld for the present, on account of their connection with other works.

The steamer George G. Hadley, which has occupied the stationary dry dock at Milwaukee since July 7 for the repair of damage sustained in her collision with the whaleback steamer Thomas Wilson and subsequent sinking in shoal water off the Duluth ship-canal entrance, will again be ready for business between Aug. 5 and 10. It was found necessary to entirely rebuild her starboard bow to a point 50 ft. abaft the stem. Her port bow requires only partial reconstruction. In addition she is receiving a new deck house and the entire interior work of the after cabin is being renewed, the seas having left but the outer shell.

Army engineer officials in charge of the St. Clair ship-canal have sent out warning to vessel masters regarding violation of rules for the navigation of the canal. It is said that the rule forbidding a vessel to pass another going in the same direction while in the canal has been violated frequently of late. Among other things the regulations especially forbid any vessel approaching closer than 500 ft. to any other vessel which it is overtaking and forbids the overtaking boat from passing the boat ahead of it until both boats are entirely outside of the canal and its approaches. The law also provides that a speed greater than 8 miles an hour shall not be attained within the canal, and also requires all captains to obey the directions, orders and instructions of the canal custodian while they are inside the canal.

Vessel masters trading to and from Lake Superior have expressed some anxiety regarding a cluster of piling that is being driven in the upper St. Mary's river opposite Big point, between the upper end of the canal and Point aux Pins but the work will not prove an obstruction to navigation. Major W. H. Bixby, United States engineer, says regarding it: "This piling is a temporary construction authorized by the secretary of war in connection with the Sault City water works intake pipe and crib. At present there is plenty of width of channel around the temporary construction. When the intake is finished, the piling will have been cut off or pulled out so as to leave 40 ft. clear depth over all constructions which may lie above the natural bottom. The inspection of this work is under the local charge of Assistant Engineer Joseph Ripley at the Sault, who has been keeping himself well posted as to progress of the work since actual construction was commenced."

At the annual convention of the International Longshoremen's Association at Chicago, just closed, it was decided to change the name of the association to the International Longshoremen, Marine & Transport Workers' Association. Daniel J. Keefe of Chicago was re-elected president and Henry C. Barter of Detroit re-elected secretary. The following vice-presidents were elected: John Walsh, Cleveland; John J. Joyce, Buffalo; J. Gordon O'Neill, Duluth; J. A. Madsen, Portland, Ore.; Cornelius Wild, Buffalo; J. A. Gwin, Galveston; Frank Morrell, Ashtabula; James McLaughlin, Windsor, Ont., and J. E. Porter, New Orleans. The convention voted to ask for a joint conference of the freight handlers of the great lakes and the managers of the freight lines, to be held in February, to decide upon a wage scale for next year. The convention also declared against allowing crews of boats and non-union workmen to trim ore and grain cargoes.

The wreck of the steamer George Dunlap, which sank in Lake Erie on the morning of June 29, has been located by United States Assistant Engineer Wm. T. Blunt of the Cleveland district. The vessel lies on an even keel, heading E.S.E., in 44 ft. of water, E. ½, S. 5⅞ miles from Middle island lighthouse, and exactly east from the Middle island passage. It is almost exactly on the range of nun buoy on the northeast corner of Keiley island reef and the extreme northeast point of Kelley island. It is N. ½ W. from Huron lighthouse and N.E. by N. ¾ N. from the red gas buoy at the entrance to Sandusky harbor, directly on the course to the Southeast Shoal lightship. It is but 2 miles northerly from the sailing course between Cleveland and Middle island passage. It is, therefore, a menace in thick weather to vessels passing between Sandusky and Southeast Shoal lightship or between Cleveland and Middle island passage. The foremast is still standing with an association flag attached and the wreckage of the pilot house is floating attached to the wreck. A floated buoy carrying a large red flag has been placed about 300 ft. south of the wreck for the purpose of location, should the spar be carried away. The location of the vessel is so close to the international boundary that it is not certain whether it is in the United States or Canadian waters.

The Havana dry dock, purchased from Spain, will be permitted to remain in Havana for the present. The project of towing this dock to the Philippines has been definitely abandoned.

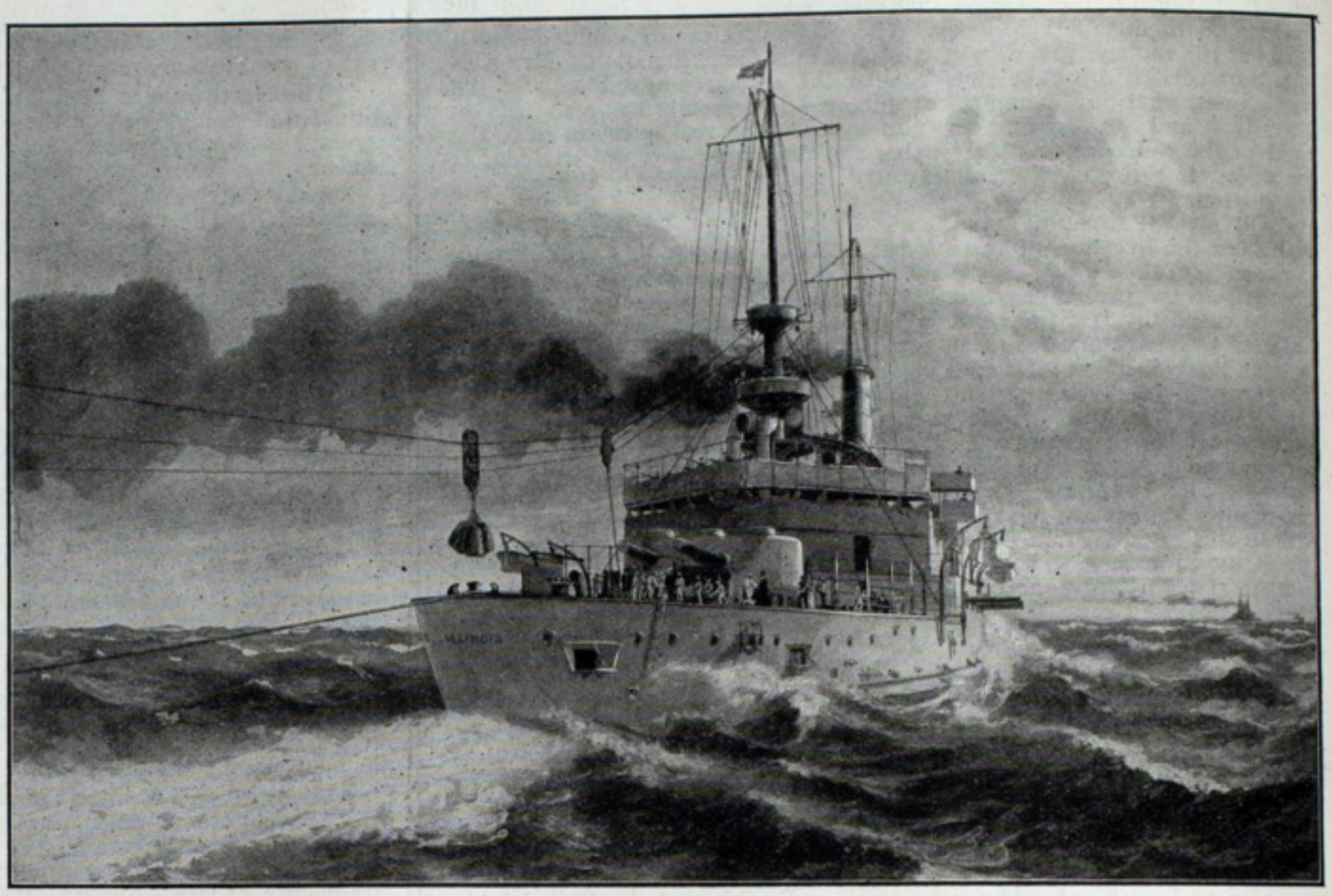
CABLEWAY FOR COALING AT SEA.

Reference has several times been made in these columns to the Lidgerwood-Miller marine cableway for coaling vessels at sea and to success attained with the apparatus in experiments conducted for the British and United States navies. New views of the apparatus, obtained since it was installed upon the U. S. S. Illinois by the Lidgerwood Manufacturing Co. of New York prompt further reference to it. The first cableways of this kind were placed upon the collier rather than upon the ship to be coaled. With this method an average of 39 tons of coal transferred per hour for five hours was attained while the ships were rolling heavily in such bad weather that at one time the hawser parted. The best record in tests made under more favorable conditions was 64 tons per hour with loads of one ton.

One of the illustrations on this page shows a battleship of the United States navy, the Illinois, equipped with the cableway. The chief advantage of this system is that it will permit the battleship to take coal at sea from any masted vessel which it may meet in any quarter of the globe. The equipment requires two special winches, which have been so designed as to serve a double purpose. The winches originally located on the superstructure deck of the Illinois have been displaced by these two special winches, which serve all general purposes of the original machines, and in addition are adapted for operating the marine cableway when coaling at sea. In this manner there has been no essential increase to the machinery of the warship and no additional deck space has been required. The only additional equipment on deck consists of a few bolts, a coil spring at the masthead, and two levers conveniently located on the after bridge. Just below the steering compartment and beneath the platform deck the remainder of the equipment is located. A reel suspended from the deck carries 2,000 ft. of ⅞-in. sea anchor line. There are also two ⅜-in. conveyor lines and two sea anchors. There are also the haul-down block, carriage blocks, etc., all of which occupy a space, just below the deck, 16 ft. long, 7 ft. wide and 4½ ft. deep. The coil spring attached to the mainmast will be completely compressed under a load of 20,000 lbs., but a strain of 12,000 lbs. only is developed in carrying a load of one ton. As the warship pitches and ascends, this spring will compress and elongate, thus serving to equalize the somewhat varying strain on the sea anchor. After the sea anchor has been located and the sea anchor line made taut, the tail block is hauled over and attached to the mast of the collier. This carries with it the conveyor line from one of the winches. At a point above the sea anchor line another lashing is made as shown in one of the illustrations, and two ¾-in. wire guy ropes are there attached and led forward on an incline to the starboard and port sides of the ship, where they may be attached to the deck at almost any place found convenient. On these two inclined stays will run two little elevating trucks, weighing only 37 lbs. each. Loads of one ton can be hoisted from the port deck and then the starboard deck, in alternation, to the masthead, where two men are located. One of these men takes in his hand the loose ring which is a part of the elevating hook. When the cableway carriage reaches the collier's masthead the ring is placed by hand over the hook of the carriage, a lever is pulled on the elevating truck, and the load is dropped and thus transferred to the cableway carriage. This operation, by actual time, has been accomplished in two seconds. The other man at the masthead will take off the empty bags as they return from the warship and send them to the deck for refilling.

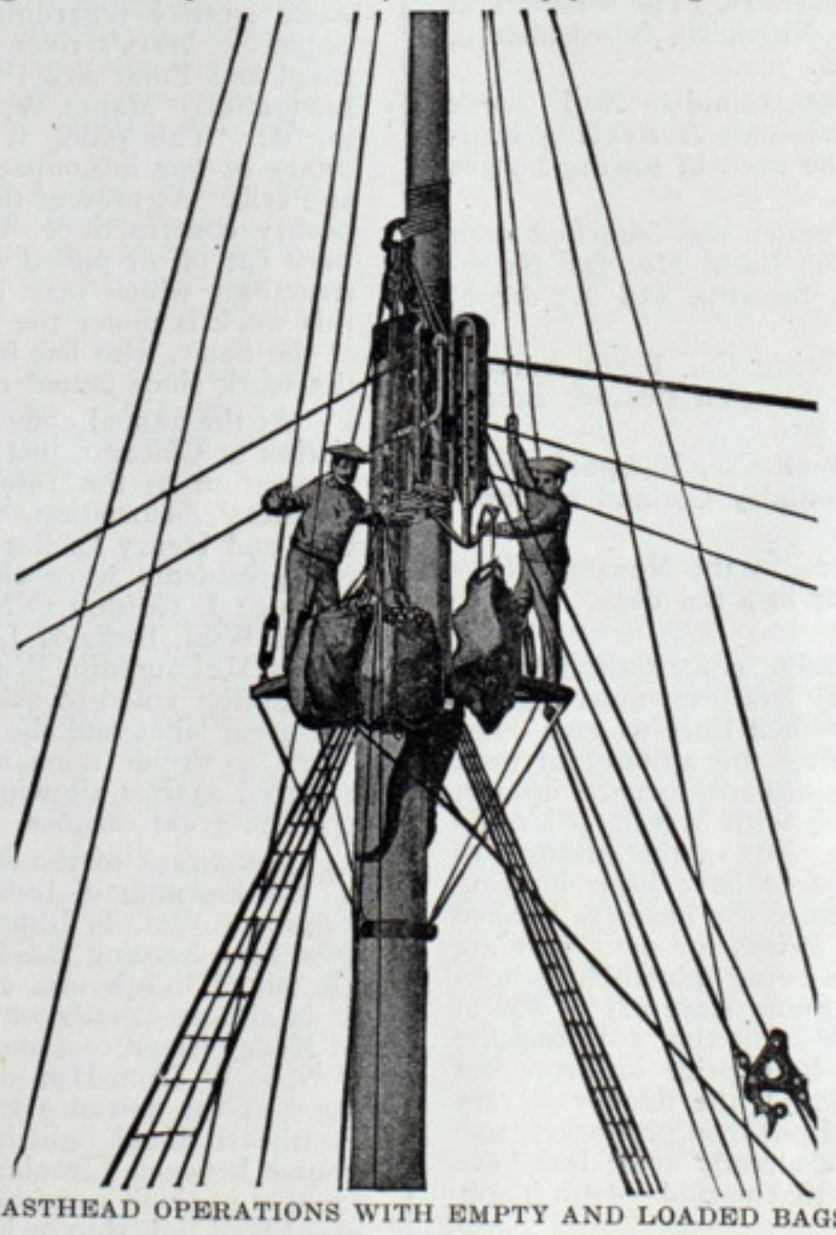
With the present arrangement the load starts from the collier on a down-hill route and continues so for more than half the distance. When the load is just clear of the center of the span and in its lowest position the man on the warship begins to pull down the haul-down block, and by the time the bags reach this block they will be trailing on the deck. The operator then stops for an instant, lowering continues for a foot or more, the load is unhooked from the carriage, the empty bags put on and the whole lifted to its normal position. At the same time the operator sends the empty carriage back to the collier for another load. The capacity of this equipment should be sixty round trips per hour, and the quantity delivered should not be less than 40 tons in the same time. The chief limiting factor in the capacity will be the ability of the men on the collier to feed the cableway.

By having our warships thus equipped the question of coal supply is largely solved, and solved with less cost than in any other way, since they can coal direct from any collier and are not dependent upon coaling stations. Our navy needs a few colliers in peace times, and a great many in case of war. Any masted ship, either sailing vessel or steamship, can do duty as a collier and deliver its coal at sea to any warship equipped with a marine cableway.



U. S. S. ILLINOIS TAKING COAL AT SEA—USING LIDGERWOOD-MILLER MARINE CABLEWAY.

BAGS ON DECK READY FOR HOISTING.



MASTHEAD OPERATIONS WITH EMPTY AND LOADED BAGS.

CHANGES IN THE NAVAL REGISTER.

The mid-summer revision of the naval register, which will be issued from the naval intelligence office at Washington in a few days, contains many facts of value to the service and to those interested in its personnel. Admiral Dewey remains at the head of the active establishment, his duty being given as "senior member, general board." Rear Admiral George C. Remey, chairman of the lighthouse board, is the senior officer of his grade, and Capt. F. A. Cook, who commanded the armored cruiser Brooklyn in the war with Spain, is the senior captain. Com'dr L. C. Logan stands No. 1 on the list of commanders, and Lieut Com'dr S. W. B. Diehl. Lieut. William Truxton, Lieut. (junior grade) D. M. Garrison and Ensign John H. Alligan, Jr., are the senior officers of their respective grades. Medical Director George F. Winslow is the ranking officer of the medical corps; Rear Admiral A. S. Kenny, paymaster general, holds this position in the pay corps; Chaplain D. H. Tribou is the leading chaplain; W. W. Hendrickson, the senior professor of mathematics; Naval Constructor J. F. Hanscom, the senior officer of the construction corps, and Rear Admiral M. T. Endicott, chief of the bureau of yards and docks, is the head of the civil engineer corps.

Considerable doubt existed in the bureau of navigation as to where Pay Inspector Stephen Rand should be placed in the navy list. Mr. Rand is the officer whose promotion was recently refused by the president on the ground of insufficient sea service. Mr. Rand was the senior pay inspector, and a vacancy existed for him in the grade of pay director. The

question has been solved by placing him among the pay directors with a star, to indicate a footnote, which says, "Subject to nomination."

The new roster of the line of the navy shows that in the last six months there have been eight promotions to the grade of rear admiral, sixteen to that of captain, eighteen to that of commander, twenty-two to that of lieutenant commander, twenty-three to that of lieutenant, thirty-nine to that of lieutenant, junior grade, and fifty-six to that of ensign, leaving 116 vacancies still to fill at the bottom of the list. These vacancies in the grade of ensign can only be filled by midshipmen from the naval academy under the law, and as the classes for the next five years will not produce over sixty graduates annually without legislation cutting down the length of the course to four years, as it is at West Point, the navy must continue to suffer for lack of junior officers.

In the last six months twenty-eight officers have resigned, twenty-six have retired, two high ranking officers have died and one has been dismissed. Among those who resigned were Lieut. J. H. Roys, of New York, whose last duty was in command of the president's yacht, the Sylph; Ensign F. H. Helm, Jr., of Kentucky, who was on the Monterey, attached to the Asiatic station; Passed Assistant Paymaster Abel B. Pierce, of Texas, and Chaplain F. C. Brown, of Massachusetts. Two lieutenants of marines, Yandell Foote and W. D. A. Junkin, also resigned. The retirements included Rear Admirals John A. Howell, B. J. Cromwell, E. M. Shepard, N. H. Farquhar and G. H. Wadleigh, and Capt. Samuel C. Lemly, judge advocate general. Those who died were Rear Admiral William T. Sampson and Rear Admiral Lewis Kimberly. The officer dismissed was Capt. B. S. Neumann.

The register shows that the United States now has commisioned and in active service nine battleships, two armored cruisers, two monitors, nine protected cruisers, forty-two gunboats, twelve training ships, ten men-of-war unassigned or on special duty, nine torpedo boat destroyers and torpedo boats, and one submarine torpedo boat, in addition to colliers and auxiliaries. The vessels are distributed as follows:

North Atlantic station—Three battleships, one armored cruiser, one protected cruiser and two gunboats.

European station—One battleship, three protected cruisers and one gunboat.

Asiatic station—One battleship, one armored cruiser, two monitors, one protected cruiser and twenty-six gunboats.

Pacific station—One battleship, one protected cruiser, two gunboats and one torpedo boat.

South Atlantic station—One battleship and one protected cruiser.

Unassigned—One battleship (to be attached to the Asiatic squadron), one protected cruiser and three gunboats.

Training service—One battleship, one protected cruiser and ten gunboats and auxiliary cruisers.

Special service—One gunboat, the Mayflower, used as the president's yacht; three other gunboats and one submarine boat.

ANNUAL REPORT OF MESSAGERIES MARITIMES

The annual report of the Messageries Maritimes (leading French steamship line) for last year shows that the company did only moderately well. This adverse result is largely attributable to the dearness of coal during the greater part of the year. The number of steamers owned by the company was reduced by two, the Sindh and Tanais having been sold. The number of vessels owned by the company is sixty with a tonnage of 241,076 and an aggregate horse power of 203,050. A large cargo boat, known at present as No. 117, is building at the company's works at La Ciotat but the construction of this vessel was not pushed forward so actively last year as it might have been, the council of administration not being disposed to increase the working staff, and also being in no hurry to enter upon commercial navigation until the law on merchant shipping, which has been for several years past in course of preparation, had received the sanction of the French legislature. The council of administration prides itself upon the prudence which it displayed, as it appears that ships brought into service before the promulgation of the new law are not allowed to participate in the premiums accorded. No. 117, which is to be launched in the course of the antumn, will be admitted into the company's fleet early next year; the expenditure made upon her in the course of 1901 was £51,522. The removal of the Sindh and the Tanais from the fleet reduced its initial value to the extent of £147,026, but the cost of the two vessels had been previously wholly written off by the annual allowances made for depreciation. The later additions to the company's fleet appear to have been of greater staying power. Thus ships built between 1852 and 1860 yielded, on an average, only twenty years' service; while of the vessels withdrawn from the fleet since 1890 it was observed that fifteen had had an average career of 30½ years. On the company's Atlantic line, which was established in 1860, steamers first began to be replaced between 1869 and 1872, and the process of renewal was completed between 1872 and 1878. Some renewals were again made in 1888 and 1899, and three further steamers—the Chili, the Cordillere, and the Atlantique—were added between 1896 and 1900. Upon the Indo-Chinese line the first steamers brought into use in 1862 have been renewed three times, while the latest renewals have been effected by the introduction into the service of the large steamers Ernest Simons, Laos, Indus, Tonkin and Annam. Similar changes have occurred upon the Australian and the Caledonian line, the large steamers Australien, Polynesien, Armand Behic, and Ville de la Ciotat having succeeded vessels of the Yarra and Melbourne type, which were brought into use upon the creation of the line in 1882. The Madagascar line is now accommodated by the steamers Natal, Melbourne, Iraouaddy, Yangtse, Djemnah and Oxus, which were originally built for the Indo-Chinese service. Similarly, the steamers Portugal, Congo, Equateur, Senegal, and Niger, which were originally built for the company's Brazil and La Plata line, have now been transferred to the Mediterranean, where they are working upon postal lines. Of the sixty steamers which the company owned at the close of last year, fourteen have now swung clear of the writing-down process; that is, it is not necessary to make any further allowances for their depreciation, as in any case they may be expected to realize something over the reduced amounts at which they stand in the company's books. The original cost of the company's fleet (the total covering hulls, engines equipment, and, in fact. everything) was £7,832,391. Of this amount, the annual allowances made for depreciation have cleared off £3,810,957, leaving the present book value of the fleet at £4,021,434, or 51.43 per cent. of the initial outlay.

Allusion has been made to the dear coal difficulty, against which the council of administration had to contend last year. This difficulty has been gradually becoming more intense. In 1897 the cost of the coal consumed by the company's steamers showed an increase of £49,620, as compared with 1896, the average cost of the coal consumed having been about 10d. per ton more. In 1898 the crisis became much more acute, the additional outlay for fuel used, as compared with 1896, rising to £137,557. In 1899 the pressure gradually became more severe, and the comparison showed an increased outlay of £205,707, as contrasted with 1896. A comparison of 1900 with 1896 showed increased outgoings, under the head of fuel, to the extent of £342,157. It is fair to remark that this increase in expenditure was partly attributable to the fact that the company's steamers ran during the year an additional 1,014,464 leagues, in consequence of the exhibition of Paris, and the expedition undertaken to China. In 1901 matters gradually grew worse, coal having become still dearer; the increased cost of fuel last year, as compared with 1896, was no less than £374,524. The average difference in the cost of the coal used in the company's steamers in 1901, as compared with 1896, was 6s. 10d. per ton. The company endeavored to meet—or, at any rate, to mitigate—the difficulty by having recourse to American coal, of which it used 73,802 tons last year. The company has also been using of late more Asiatic coal, of which 176,836 tons were purchased last year, as compared with 76,791 tons in 1896.

DEVELOPMENT OF THE SCHOONER.

The Boston Herald publishes the following chronology of the conception and development of the schooner rig of sailing craft:

1714—First two-masted, fore-and-aft vessel, ever constructed in the world, built at Gloucester, Mass., by Capt. Andrew Robinson. She was an innovation on anything ever before seen in the rig of a vessel, incidentally giving Andrew Robinson much perplexity as to its designation. On the day of the launching, happily for the builder and the world at large, the problem was solved by a bystander, who observed, as she slid into her home: "How she schoons!" "If she schoons she must be a schooner," remarked the builder.

1849—First three-masted schooner ever constructed, the Zachary Taylor, built at Hanover street wharf, Philadelphia, by Matthew Vandusen, for Capt. James A. Mershon, father of Charles Mershon, the Walnut street ship broker. Her mizzenmast was much shorter than the other masts. She loaded a cargo of cars, engines, machinery, small boats, etc., for Chagress, a port near where Aspinwall is now located. She ran for two years, and was lost in Delaware bay. She was about 250 tons register and carried 375 tons of cargo.

1849—Second three-masted schooner, the Spray, built at Wilmington, Del., for Capt. Isaac Cathcart. She had a long mizzenmast, just as the present three-masters have. She loaded for California and was sold out there.

1866—Largest two-masted schooner, the Oliver Ames, 456 tons register, built at Berkley, Mass.

1880—First four-masted schooner, the W. L. White, built at Bath, Me., by Goss Sawyer and Packard for Jacob B. Phillips of Taunton, Mass. She registered 995 tons gross, and was the largest vessel of her class at that time in the world. She was a four-master by accident, for she was originally designed for three masts, but it was thought that they would be too unwieldy, and so the fourth mast was added.

1881—Second four-masted schooner, the Francis C. Yarnall, built at Wilmington, Del.

1882—First schooner over 1,000 tons register, the Elliott B. Church, built at Bath, Me. She registered 1,137 tons and was a four-master.

1882—Second schooner over 1,000 tons register, the Augustus Hunt, built at Bath, Me. She registers 1,200 tons, is still afloat and has four masts.

1884—Largest three-masted schooner ever constructed, built at Kennebunk, Me., the Bradford C. French, 968 tons gross.

1884—First schooner over 1,300 tons register, built at North Weymouth, Mass. She was the Haroldine, 1,361 tons register, and was a four-master.

1886—Second schooner over 1,300 tons register, built at Bath, Me. She was the Sarah W. Lawrence, 1,369 tons register, and had four masts.

1887—First schooner over 1,600 tons register, built at Bath, Me., the T. A. Lambert, 1,630 tons register. She had four masts.

1888—First five-masted schooner, the Gov. Ames, built at Waldoboro, Me., 1,778 tons register.

1896—First schooner over 1,800 tons register, built at Bath, Me., the William B. Palmer, 1,805 tons register; has four masts.

1897—First schooner over 2,000 tons register, built at Bath, Me., the Frank A. Palmer, 2,014 tons register, and up to date is the largest four-master ever built.

1898—Second five-masted schooner, the Nathaniel T. Palmer, built at Bath, Me., 2,440 tons register.

1899—Third five-masted schooner, the John B. Prescott, built at Camden, Me., 2,454 tons register.

1900—First schooner over 2,600 tons register, the William C. Carnegie, built at Bath, Me., 2,663 tons register; five masts.

1900—First six-masted schooner built at Camden, Me., the George W. Wells, 2,970 tons gross register.

1900—Second six-masted schooner, the Eleanor A. Percy, built at Bath, Me., 3,401 tons register.

1901—Five-masted schooner Baker Palmer, built at Waldoboro, Me., 2,792 gross tons register.

1902—Five-masted schooner Prescott Palmer, built at Bath, Me., 2,811 gross tons register. Largest five-master afloat.

1902—Seven-masted steel schooner Thomas W. Lawson, built at Quincy, Mass., for the Crowley boys. First seven-masted vessel in the world and the first steel schooner ever built in America; capacity 8,000 tons of cargo.

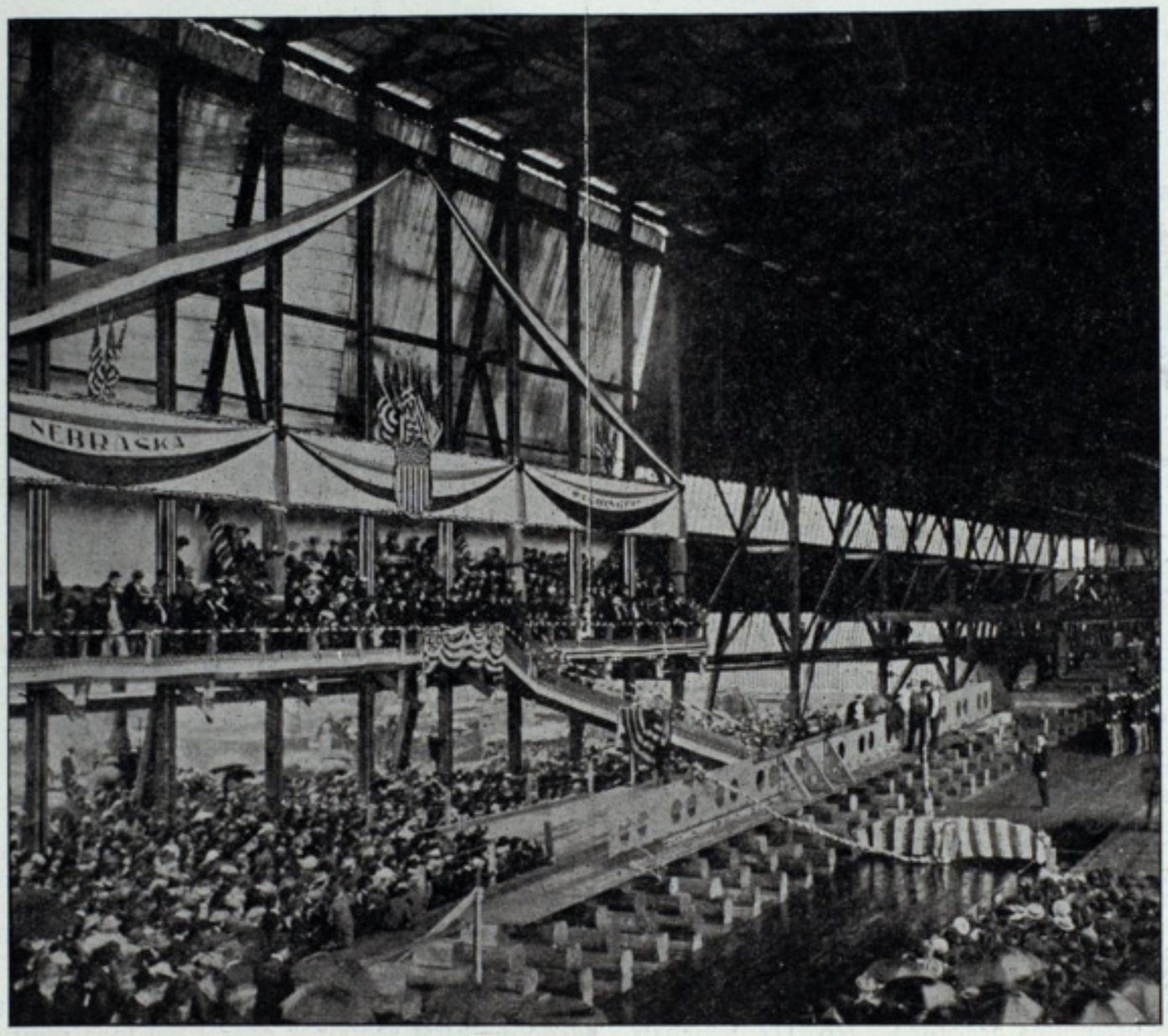
The Houston line, which has a fleet of twenty-one steamships in the South African trade, has, according to a New York dispatch, secured contracts for shipping all machinery needed from England and the United States for the British South African Co., the Rhodesia railway and the Consolidated Gold Mines.

A SHIP OF THE PACIFIC NORTHWEST.

Govs. Savage, of Nebraska, and McBride, of Washington, driving the first rivet.

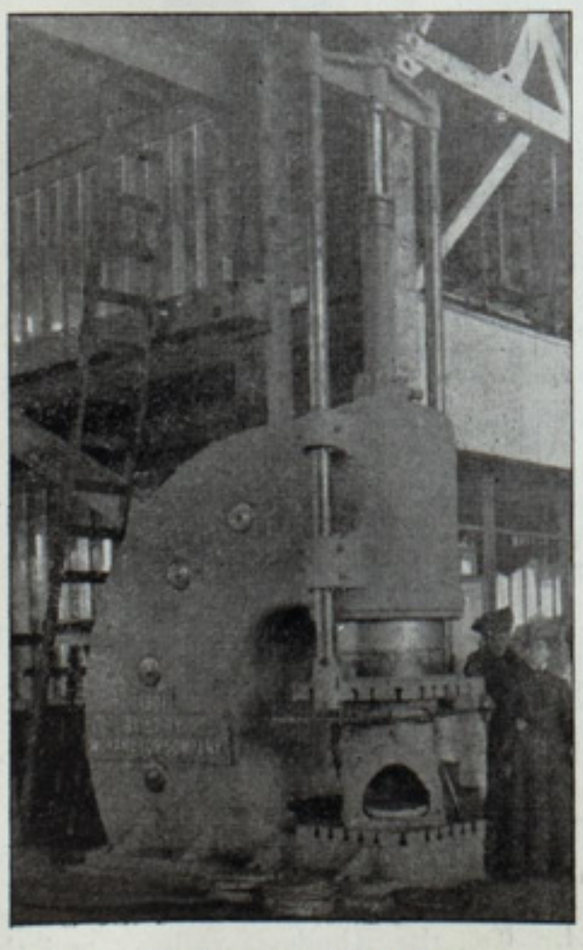
A short account was published in these columns two weeks ago of the elaborate ceremonies conducted at the works of the Moran Bros. Co., Seattle, Wash., on July 4, when the keel of the battleship Nebraska was laid. As this event marked an epoch in the ship building industry of the Pacific northwest, it was thought worthy of special attention, and the Review has since secured some illustrations of the works at Seattle, together with a brief history of their development. The keel of the Nebraska was laid, with the assistance of Gov. Savage of Nebraska and Gov. McBride of Washington, and in the presence of some 15,000 people. The navy was represented at the event by a number of prominent officers and a detachment of marines and band from Puget Sound navy yard. There were present also several distinguished army officers. The two governors who took part in the ceremony were accompanied by their respective staffs. Elaborate preparations had been made by the company for the reception and accommodation of the visitors. Before and after the ceremonies the principal tools in the various shops were operated, giving the visitors opportunity to witness actual work in progress.

The mechanical operation of laying the keel consisted of hoisting a section of the structure 72 ft. long, weighing in excess of 20,000 lbs., from the shop floor to an elevation about 20 ft. and carrying the same in mid-air to the proper point over the keel blocks on which it was lowered, the entire operation consuming less than five minutes. A rivet was then driven by the two governors, each removing his coat and rolling up his sleeves for the purpose. An accompanying photograph fully shows this performance. Appropriate and eloquent speeches were made by Govs. Savage and McBride, also by a number of local citizens. The ceremony was most impressive throughout and the event was a perfect success in all its details.



SECTION OF THE KEEL OF THE BATTLESHIP NEBRASKA ON THE BLOCKS.

The battleship Nebraska is one of five vessels, the construction of which was authorized by congress two years ago. These vessels are of the following dimensions: Length between perpendiculars, 435 ft.; length over all, 441 ft. 3 in.; breadth, moulded, 76 ft.; breadth, extreme, 76 ft. 2½ in.; mean draught, 23 ft. 9 in.; displacement, 15,000 tons.



THE 1,000-TON HYDRAULIC PRESS.

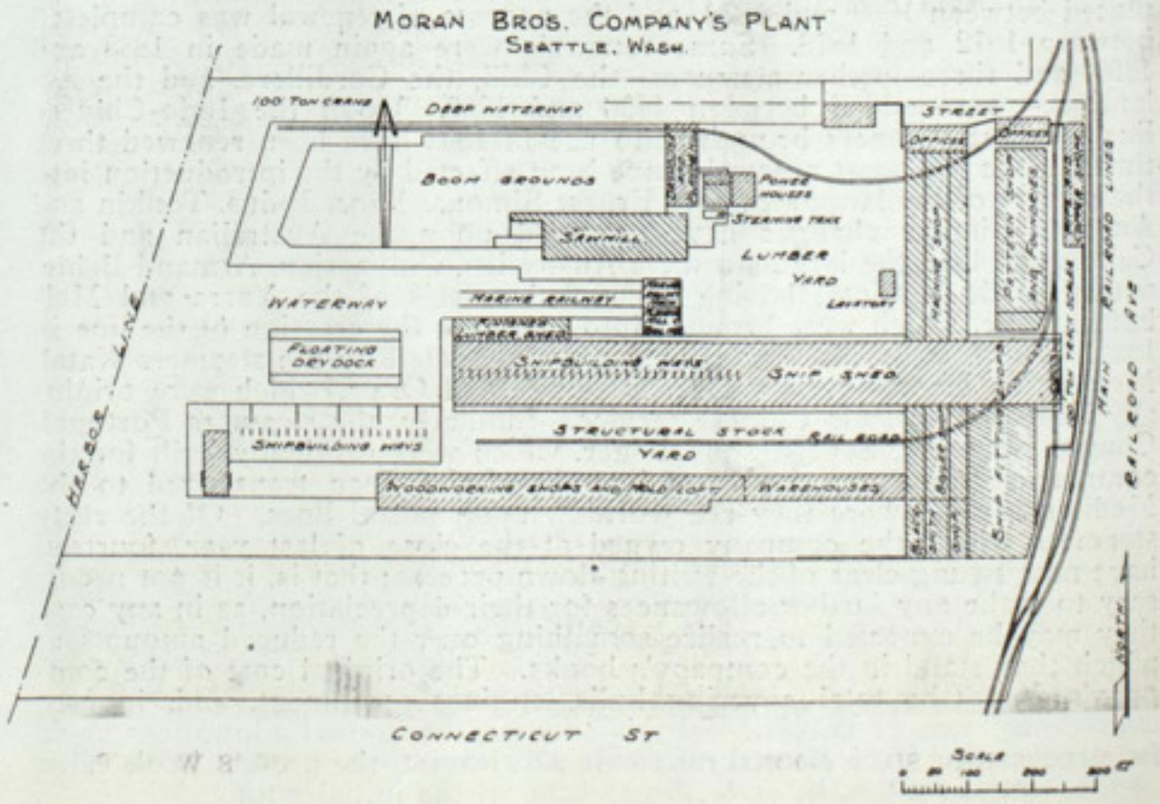
The main battery of these vessels is to consist of four 12-in. breech-loading rifles, eight 8-in. breech-loading rifles and twelve 6-in. breech-loading rapid-fire rifles. The other four battleships of the type to which the Nebraska belongs are being built in Atlantic coast yards. Seattle is a city on Puget Sound barely fifty years old. Moran Bros. Co.'s plant had its beginning twenty-two years ago. The success and rapid growth of these works is the remarkable result of the enterprising spirit of a few men aided by untiring and energetic efforts. These men were seven brothers, of whom, it is to be regretted but four remain, three having died during late years. The leader of these brothers has, from the beginning of their association, been Robert Moran, who is now president and general manager of the company. Prior to the year 1889 no vessels had been built by the Moran Bros. Co. The first steel vessel built in the state of Washington was launched from their yard during the year 1896. Since that time a number of such vessels have been built at their establishment, as well as a number of other classes of vessels, sail and steam, for ocean, sound and river service.

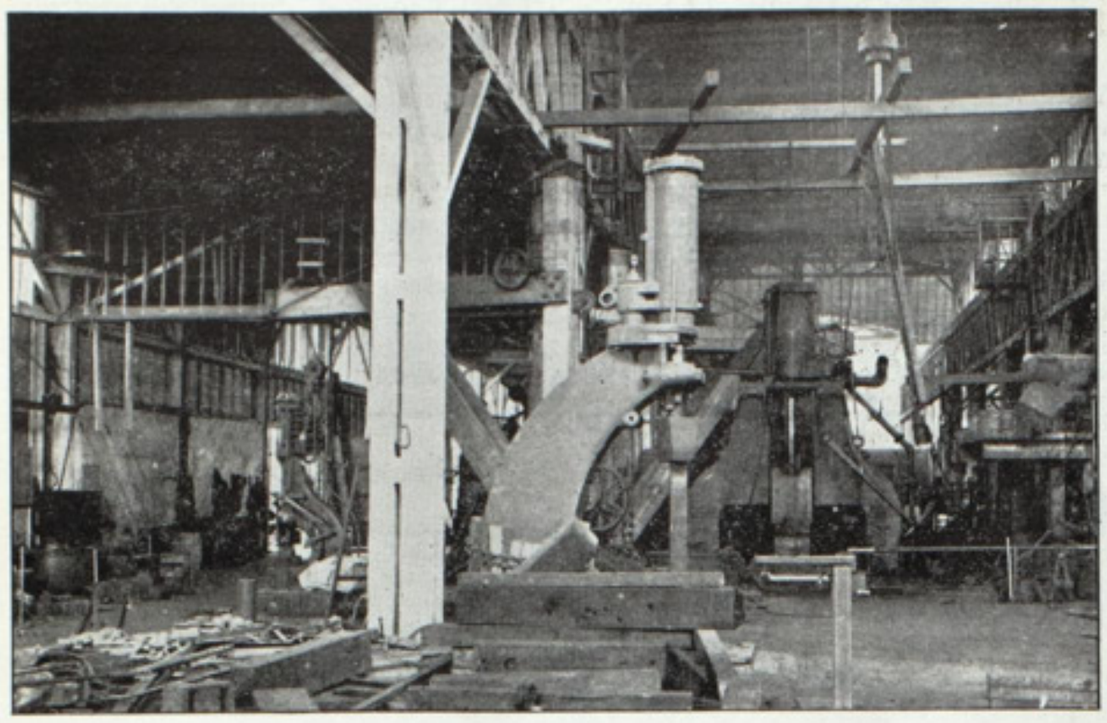
Among the naval vessels turned out by this company is the torpedo boat Rowan. The contract for this vessel was awarded in the fall of 1895 and the vessel was delivered to the navy department two years later. The contract for this torpedo boat called for a trial speed of 26 knots, and considering the trouble which has been experienced by other ship builders in the construction and trials of torpedo boats, the results attained on the official trial of the Rowan are very creditable to the builders, the trial speed attained being 27¼ knots, over one knot in excess of the trial speed called for by the contract.

In the early part of 1898, following the gold discoveries in Alaska, Moran Bros. Co. undertook to build, including hull, machinery and equipment, and deliver at the mouth of the Yukon river at the time of opening of navigation on the river, twelve steamers, each 200 ft. long. The construction and thorough equipment of these vessels were accomplished in a period of five months, construction having begun in January and the twelve vessels being ready for steam before the first of June. These vessels were taken to the mouth of the Yukon river under their own steam, arriving there in time to do good service during the open season, and they are even now considered to be the best vessels on the river.

New power tools, many of which were designed especially for this plant, have lately been installed, among which, and most remarkable, is an immense hydraulic press designed and built by Moran Bros. This press is used for large punching, flanging, etc. Connected to the hydraulic pressure intensifier, this press exerts a power of 1,000 tons, and by reason of its open gap has a large range of application. A photograph of this tool, obtained from the company, and here reproduced, shows the press as installed.

A miniature map of the plant showing the general arrangement thereof is printed herewith. It will be noted that the ship-shed in which the present battleship is being built crosses the main shop at right angles. This shed is 920 ft. in length with the ship building slip in the west end. The east half, with adjoining buildings, are the ship fitting shops, equipped with power tools. Service for handling material in this shed is given by two electric high-speed traveling cranes, each spanning one-half the width of the shed. A central electrically-driven trolley is also being installed, giving independent service along the middle of the shed. These cranes and trolley at a high elevation cross without interference and with more than ample working space over the regular shop traveling cranes, giving the ship-shed hoisting appliances uninterrupted travel from the extreme east end of the shed to the west end, their combined working range covering the entire ship-shed floor, and with the invaluable advantage of the working range these cranes and trolley have over the main shops at the place of intersection of the ship-shed with these shops, the





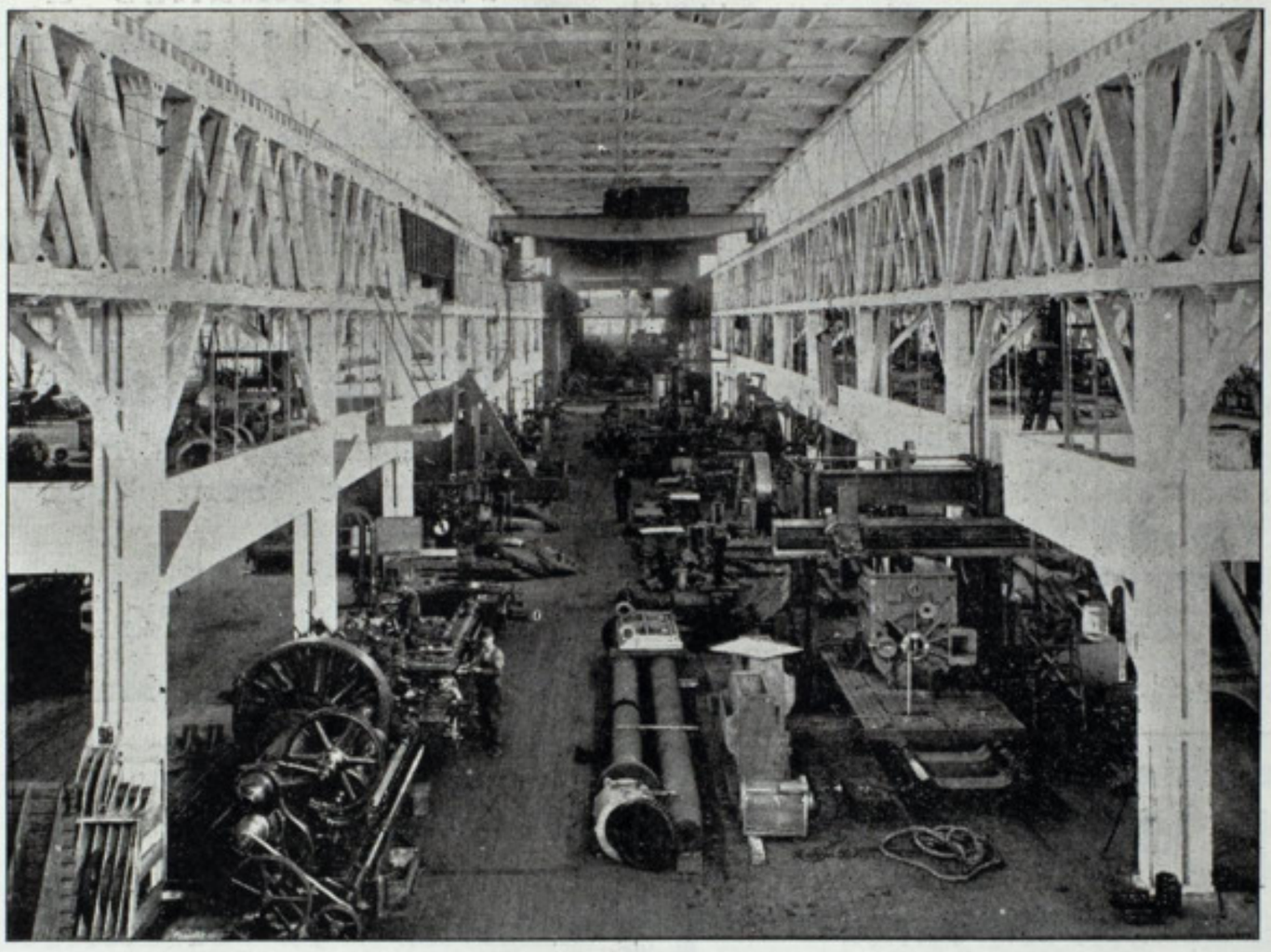
IN THE BLACKSMITH SHOP AT MORAN BROS. CO.'S WORKS.

IN THE MACHINE SHOP LOOKING NORTH AT MORAN BROS. CO.'S WORKS.

facilities for handling materials in ship construction are of the best. It might be said that the battleship now being constructed is set up in the shop. An examination of the accompanying map will bear this out.

This plant also includes a modern saw-mill where Puget sound timber, and also imported hard woods, are manufactured into dressed lumber for all purposes. This department of the plant includes the saw-mill proper, where logs up to 8 ft. in diameter and 125 ft. long can be cut into large or small lumber; also planing mills, steaming plant and dry houses. Spars of the largest diameter, made of faultless timber, are turned out in this mill.

With the refuse from the saw-mill steam power is generated for the operation, aside from the mill itself, of hydraulic, electric and compressed air power plants. Electric current is used for the operation of shop tools, and all large tools are fitted with independent motors. A number of portable appliances are also operated electrically. Pneumatic tools are in use throughout the works for innumerable purposes. Hydraulic power is applied to flanging and punching appliances, also to riveters. The large forging hammers, generally called steam hammers, are operated here with compressed air. Only modern appliances are in use, it having been the aim of this company to equal in point of equipment and convenience of arrangement any plant in existence.



IN THE MAIN SHOP LOOKING SOUTH AT MORAN BROS. CO.'S WORKS.

The company has long had in operation a large marine railway. Last year saw the addition to the plant of a floating dry dock of 3,000 tons capacity. A new dry dock and floating derrick combined is under construction, the derrick being designed for lifting heavy machinery, ordnance, etc., in outfitting vessels. The derrick will have a lifting capacity of 100 tons and will be operated by electricity. The arrangement of the plant, as shown by the accompanying drawing, covers an area of approximately twenty-eight acres. Additional lands belonging to the company adjoin on the south and make it possible to extend the plant as may be necessary.

Aside from the battleship Nebraska there are under construction by Moran Bros. Co. one steel lighthouse tender, the Heather, 175 ft. long, and two steel tugs, each 90 ft. long. There is on hand also a large amount of general vessel repair work, which is a large proportion of their business.

The works as now operated comprise, aside from the ship-shed and ship fitting shops above described, a blacksmith shop equipped for the heaviest forgings, a boiler shop in which boilers of the largest size are built, a machine shop equipped for a large output of small and large work, a pipe and copper shop in which are produced sheet metal and pipe work of all descriptions, a pattern shop, brass and iron foundries where castings of size representing 50 tons can be made. The steel ship building shops include large bar and plate furnaces. Large storehouses and store rooms are kept well stocked with machinery, fittings and supplies entering into the construction and outfit of marine and stationary work. A mold loft 50 by 600 ft. is used for laying out lines of vessels preparatory to their construction. The company's drawing office employs a force of thirty to forty men in the preparation of plans for work under construction and in contemplation.

The works are located on a deep water frontage in the business portion of Seattle. Water frontage nearly 1,000 ft. long on the face of property together with piers and water ways give the plant nearly a mile of wharf face for berthing vessels; hence the docking facilities and frontage are ample for the accommodation of a large number of vessels, there being at times as many as ten of large dimensions undergoing repairs. A heavy crane of the shear leg type and of 100 tons capacity is used for handling heavy weights in and out of vessels.

The railroad connections to the works are also very conveniently arranged. Cars loaded with ship building material are delivered into the yard, where they are weighed on track scales of 100 tons capacity, and there unloaded by means of electric traveling cranes. Spurs from the main railroad tracks extend to the deep water wharves, one of these passing under the 100-ton crane already described, thus permitting of the handling of heavy weights directly to or from the cars and vessels. Other tracks run through the shops at various points and the transportation of the output of the shops from any point to the main railroad lines or wharves is rendered an easy task.

Aside from the ship building and the output incident to such construction Moran Bros. Co.'s works are equipped to turn out mining and other machinery of all kinds and general structural work.

IN THE BOILER SHOP LOOKING NORTH AT MORAN BROS. CO.'S WORKS.

The Austrian-Lloyd Steam Navigation Co. is about to start a direct line of cargo steamers between Trieste and Durban, via the Suez canal, with fornightly sailings. This line was really started about a year and a half ago, but the prolonged war rendered it necessary for the company to suspend the steamers. The Austrian government has now agreed to allow the company a special subvention and to pay the Suez canal tolls of those ships sailing between Trieste and Durban.

MR. WHITELAW REID ON THE SHIPPING COMBINATION.

The centenary of the American chamber of commerce of Liverpool was celebrated last Saturday night by a banquet, at which Mr. Whitelaw Reid, who was the American special envoy to the coronation, was the principal speaker. He said in part:

"If you have sustained the threatened dangers of the recent past you can surely face with equanimity the terrors of Mr. Morgan. It is not for me to speak for that most capable man or for the great masses of capital that he directs and the great enterprises, largely American, which he represents. Still less would I think of venturing an opinion as to the wisdom or unwisdom of the huge combinations he is organizing or as to their desirability for investors, their safety for the business world or their effect either on national interests or international relations, but as a mere onlooker I venture to suggest that the apprehensions aroused by the recent changes in shipping with which his name is identified appear somewhat exaggerated. In no case does your power to secure at will for your naval service as many cruisers as ever seem to be in the least imperilled. Ships built in your ship yards are forbidden to pass to our flag by a law almost as old as our history and almost as hard to change as our constitution.

"If you accept what you think is the gloomiest view of the future control of the Atlantic carrying trade it does not follow that New York would use that control to weaken the port most important to it. Even monopolies are not supposed to thrive by damaging their best customers. Besides, monopoly in this case is fanciful. It does not and cannot exist. 'Nature abhors a vacuum' and just so organized society abhors monopoly. All the forces of nature fight against any large formation of the one and all the forces of civilization against the other. None has been created in this business, and I think none is desired. I know none can long be successfully maintained. But is it necessarily altogether disadvantageous to the trade of this great port to have at least some certainty as to its business, some knowledge of what it can count on six months in advance? Surely, nothing can come nearer to reducing the legitimate trade to gambling than such features of the old system as violent fluctuations in freights, with cut-throat rates at times of hungry competition, followed by efforts to recoup later by sudden combinations or an excessive advance. When a company of men, no matter who, invest their aggregate capital so enormously in materials so perishable, while all the forces of trade tend to discourage the growth of rivals, the very law of such a company's being is steady and conservative management, together with fair-minded liberality, which is the necessary offspring of enlightened selfishness.

"Consider, besides, the advantages to a nation, which is sometimes said to be isolated, and which is certainly not always loved, of a great neutral fleet in which its food might be borne safely in spite of any possible enemy. I said any possible enemy, for I do not for a moment admit the possibility of war again between our nations. Whatever else may happen that is no longer thinkable. Nature revolts against it. All the vast interests of that vast body of English-speaking peoples, who, in both hemispheres and all the continents and seas, lead the world upward, forbid it. We talk from time to time of this government or that approaching a situation, where, like ancient Rome, it can govern the world. That is idle dross. History does not thus repeat itself. Neither your own great nation nor ours will ever govern the world or seek to, but the time does visibly draw near when solidarity of race if not of government is to prevail. There can then be no question as to what race is to press to the front in the material, intellectual and moral progress of the world. There is no question that its kindred people will march together, proud of whichever is foremost and filled only with generous emulation. Each will lead the other in one common, inspiring advance."

There have been launched in the United Kingdom during the past six months 289 vessels, totalling about 668,533 tons gross, as compared with 265 vessels, of about 725,472 tons gross, in the corresponding portion of last year; 281 vessels, of about 611,292 tons gross, in 1900; 328 vessels, of about 697,102 tons gross, in 1899; and 368 vessels, of about 686,137 tons gross, in 1898.

English ship builders in June put into the water twenty-one vessels, of about 44,073 tons gross, against twenty-five vessels, of 74,446 tons gross, in May; twenty-two vessels, of 76,818 tons gross, in June last year; and twenty-one of 73,077 tons gross, in June, 1900. For the six months English builders have launched 125 vessels, of 354,029 tons gross, as compared with 126 vessels, of 422,699 tons gross, in the first half of last year.

TRADE NOTES.

Jones & Laughlins, steel manufacturers of Pittsburgh, are continually making additions to their electrical equipment and have just ordered from the Westinghouse Electric & Mfg. Co. one 800 K.W., D.C. generator, two 150 K.W., motor-driven, two-phase alternators, and two 125-light, motor-driven arc generators.

The Chicago Pneumatic Tool Co. not long since brought suit against the Philadelphia Pneumatic Tool Co. through the Franklin Boiler Works Co. for infringement of the Moffet drill patent, controlled by the Chicago Pneumatic Tool Co., and a temporary injunction has just been granted by Judge A. C. Coxe in the United States circuit court at Utica, N. Y. The drill as manufactured by the Philadelphia company was used by the Franklin Boiler Works Co. and that is why the latter is party to the suit. The injunction is especially against the further manufacture by the Philadelphia company of the so-called Keller-Philadelphia pneumatic drill.

Capt. Geo. A. Symes of the lake steamer Iron Chief, writing to the Robeson Chemical Co., Port Huron, Mich., says: "On April 26 of this year we received from your company a consignment of 'preservo' and at the same time a letter from Mr. Corrigan, owner of the Iron Chief, requesting that we give the same a fair trial and report our findings to him as to the quality and usefulness of the same. We painted our hatch covers and canvas-covered decks on May 1. This has given us two months in which to test your composition and I am now in a position to say that the results are very gratifying. The paint has stood well for the time mentioned, and it is certainly water-proof in every sense of the word."

If one will write to William A. Hardy, Fitchburg, Mass., he will receive as dainty a little booklet as may be imagined on the subject of Hardy's S. S. metal. Hardy's S. S. metal is the original formula of Mr. William A. Hardy, designed by him in 1870, to meet the requirements of a durable anti-friction metal for steamship shaft and engine bearings. Aside from the specific purpose for which the metal was designed, it has been most successfully applied to bearings on various kinds of machinery, such as stationary engines, locomotives and railway car bearings, electric street railway armature and axle bearings, electric motors, rolling mills, steam pumps, air compressors, paper mill machinery, calendar stacks, Jordan engines, saw-mills and wood-working machinery, and high-speed machinery of every description. These are some of its advantages claimed for it: It has a compressive strength of 12,095 lbs. per square inch, which is far beyond any mechanical demand; it has a specific gravity of 7.32 and is the lightest of any known anti-friction metal; it has a shrinkage of 5.64 in. when poured into an iron mould; it has a melting temperature of 316 C. or 600 F.; it is distinctly fluid and in condition to pour well at 330 C. or 626 F.; it runs cool under pressure that would crush many anti-friction metals and will not cut or score a shaft under any circumstances. The little booklet goes into a chemical analysis of the metal and is very interesting.

U. S. Engineer Office, Buffalo, N. Y., July 23, 1902. Sealed proposals for hire of dredging plant for excavation in Niagara River and Tonawanda Harbor will be received here until 11 a. m., August 22, 1902, and then opened. Information on application. T. W. SYMONS, Major, Corps of Engineers. Aug. 14.

Proposals for Reconstructing and Repairing Piers at Fairport Harbor, Ohio: U. S. Engineer Office, No. 185 Euclid Ave., Cleveland, Ohio, July 17th, 1902. Sealed proposals for reconstructing and repairing parts of the east and west piers at Fairport Harbor, Ohio, will be received at this office until 2 p. m., August 18th, 1902, and then publicly opened. Specifications, blank forms and all available information will be furnished on application to this office. MAJOR DAN C. KINGMAN, Corps of Engineers, U. S. A. Aug. 14

Proposals for Dredging: U. S. Engineer Office, No. 185 Euclid Ave., Cleveland, Ohio, July 14th, 1902. Sealed proposals for improving Sandusky Harbor, Ohio, by dredging, will be received at this office until 2 p. m., August 14th, 1902, and then publicly opened. Specifications, blank forms and all available information will be furnished on application to this office. MAJOR DAN C. KINGMAN, Corps of Engineers, U. S. A. Aug 7